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FIRST IN

STEVE WEINMAN, EDITOR

SO WHEN DID THE IDEA OF Marine Protected Areas become a bit of a joke? For many years I would hear about new MPAs being established and think: great – hard-working conservationists have struck another blow for the planet. How long can it be before the ocean is one big protected network?

How naive! The seabed and what goes on there is hidden from the view of most of the world's citizens – almost everyone, in fact, except scuba-divers.

And while divers bring back constant reports in the form of video and photos, unless broadcast in a *Blue Planet* those images are seen mostly by other divers.

So governments the world over realised that an easy, cheap, vote-winning gesture towards conservation would be to declare swathes of seabed "protected".

They might or might not assign rangers and vessels to patrol them – who really knows? – but those MPAs prove great value in terms of column-centimetres of positive publicity and tourist blurb. Such great value that ever-more "paper parks" are bound to follow.

Now I realise that this is a cynical view, and the last thing I'd want to do is undermine all the genuine progress being made by dedicated eco-warriors. In our news pages this month, for example, we carry the story of Scottish divers who recently found a previously unsuspected reef of flameshells off the Isle of Arran.

Trawlers and dredgers had all but wiped out such beds in the Clyde, it was thought, but the MPA, established there through community efforts, has enabled the rare clam to maintain a vital toe-hold. No jokes there – it's a perfect illustration of why we need MPAs.

BUT I RAISE THE POINT about MPAs losing their credibility because of a sequence of negative news stories towards the end of 2020. Many such reports were buried in 2020 with so many more pressing issues to worry about, but the revelation that UK seabeds are being ripped up by commercial interests in *97% of our own MPAs* was a bit of a shock.

According to conservationists Oceana, in 2019 UK, European and Russian fishing-boats spent 200,000 hours trawling or dredging up seabeds in 71 of our 73 offshore MPAs. So how bad must things be in the unprotected three-quarters of our seas?

The UK government boasts to eco-conscious voters about its "30/30" initiative to safeguard the ocean and its wildlife. To that end it recently declared remote overseas territory Tristan da Cunha with its 250 inhabitants the world's fourth-largest MPA. How will it protect those 265,000sq miles if it can't even police its own home waters?

Brexit's done, so it can no longer rely on its old excuse about European legislation tying its hands. Soon after the UK MPA revelation, the European Environment Agency described the EU's own 3000 MPAs as merely "emblematic". Fewer than 1% banned fishing, and only a tiny fraction of the funds allocated were spent on environmental protection.

The time for "re-arranging of deckchairs" is over, says Oceana: "We're in an ecological emergency and need action now." Of all the problems to address in 2021, this is one where divers have a clear role in holding their governments to account.

I don't want to see MPAs devalued and turned into a bad joke. Protected areas such as South Arran that generate positive headlines should be the model for the future.

DIVER

the magazine that's straight down the line…

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DIVER Britain's best-selling diving magazine

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Ghost divers net Enigma machine

GERMAN SCUBA-DIVERS working to clear ghost fishing-gear in the Baltic Sea thought they had come across a typewriter entangled in netting.

On closer inspection, they realised that they had found a rare Enigma cipher machine from World War Two.

The story of how British cryptographers at Bletchley Park cracked the Enigma codes used in Nazi military communications is well-known, and the machine is believed to have been jettisoned during a mass scuttling of German U-boats near the end of the war 75 years ago.

The divers were working for Submaris, a scientific diving organisation based in Kiel, on a long-term commission for international wildlife charity WWF to clear ghost-nets in Geltinger Bay, near Germany's border with Denmark.

Underwater archaeologist Dr Florian Huber, who was on the dive, quickly realised the historical significance of their chance discovery.

On the night of 4-5 May, 1945, shortly before the Nazi surrender, the German Navy had executed its "Rainbow Order", whereby the crews of some 50 U-boats scuttled their vessels rather than hand them over to the Allied forces.

Altogether more than 200 submarines that had operated in the North and Baltic Seas were sunk in this way, along with their Enigma machines. Although several hundred thousand of the devices had been manufactured, only a few hundred are known to have survived the war, and they can command high prices today.

German engineer Arthur Scherbius invented Enigma machines, which were used to encrypt most of the radio messages transmitted from the German Wehrmacht and Navy and to decrypt them on receipt.

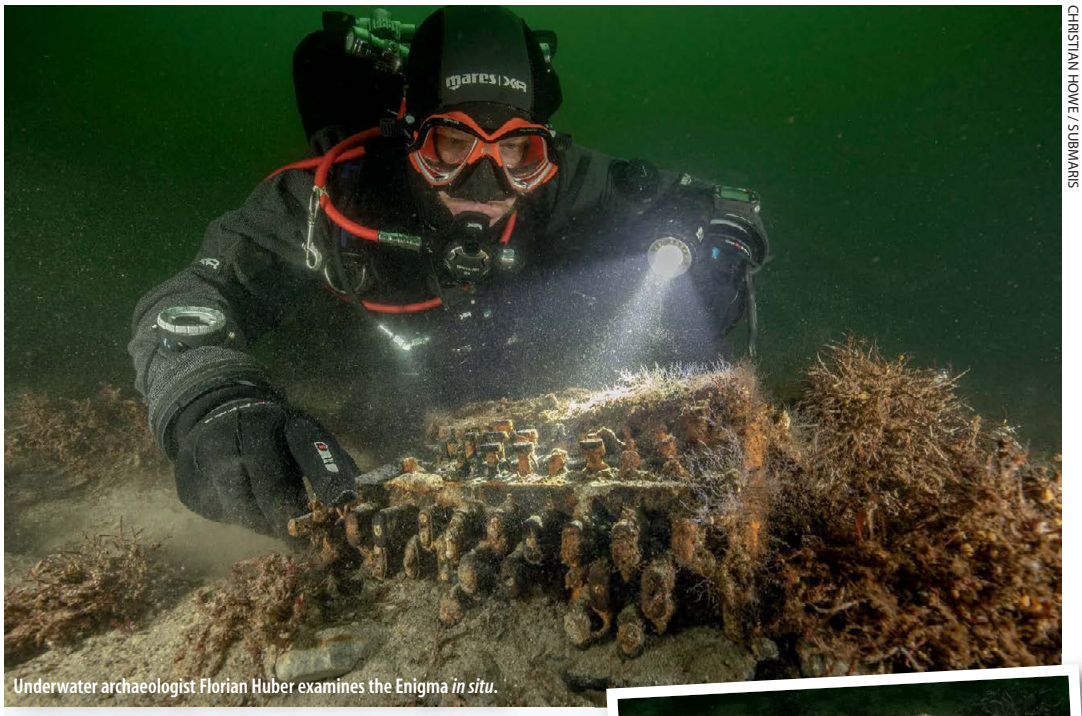
The breaking of the code by British mathematician Alan Turing's team at Bletchley in 1941 was kept a closely guarded secret, giving the Allies a vital edge in the Battle of the Atlantic.

At the peak of the operation some 3000 German messages were being decoded daily.

The divers raised the device with permission from the local authorities. It is now in the restoration workshop of the Museum of Archaeology in Gottorf Castle in Schleswig.

Designated an archaeological find, the machine belongs to the state of Schleswig-Holstein. Once conserved, it will be displayed in the museum.

Dr Huber told **DIVER** that Submaris had been working on the WWF ghost-net-removal operation for the past three years. "This also involves testing new technology to find ghost-nets, such as towed cameras and sidescan sonar," he said. "Sonar is by far the best so far."



CHRISTIAN HOWE / SUBMARIS

Underwater archaeologist Florian Huber examines the Enigma *in situ*.

From left, divers Christian Howe, Florian Huber and Uli Kunz with their find.

ULI KUNZ / SUBMARIS

Individual keys standing out on the machine's keyboard.

FLORIAN HUBER / SUBMARIS

COR KUYVENHOVEN

...AS DEDICATED DIVE-BOAT BOOSTS

MARINE-PROTECTION body Healthy Seas, which recycles recovered ghost-fishing gear, has acquired its first boat, to be operated by the volunteer divers of Ghost Diving, the original ghost-net-clearance organisation.

The boat, a 10.6m Swiftcat, was built in 2010. It was bought from Shadow Marine, which had used it to operate charter dive-trips from Ansthruther on Scotland's east coast.

Now based in the Dutch port of Ijmuiden, it will retain the name *Mako* – partly from superstition about the renaming of boats, but mainly because mako sharks are at particularly high risk of entanglement in ghost-nets and line.

Ghost Diving was one of the founding partners of Healthy Seas, and the *Mako* was bought through a donation from a Healthy Seas

MBE for top Navy diver – and death of clearance hero

ONE OF THE ROYAL NAVY'S most experienced underwater bomb-disposal experts has been recognised in the New Year's Honours list for his "inspirational leadership and operational achievements" by being made an MBE.

Sean Heaton, from Wigan, joined the Royal Navy in 1987 and became a clearance diver six years later. Promoted to Lieutenant Commander in 2014, he spent three years as officer in charge of Fleet Diving Unit 2, conducting operations and exercises around the world, before being selected in August 2017 to command the Southern Diving Group.

Under his leadership, the specialist divers from the SDG's Portsmouth and Plymouth-based bomb disposal units have rendered safe or disposed of almost 16,000 items of conventional ordnance – mines, torpedoes, hand-grenades, mortars and bombs dropped by aircraft – and successfully dealt with 97 present-day improvised explosive devices (IEDs).

Among the most high-profile tasks during this period of "Central" Heaton's career was a three-day operation to neutralise a 225kg WW2 German bomb found in February 2018 in King George V Docks, next to London City Airport.

His expertise was also called upon when Thailand asked the UK for help after seven 450kg WW2 bombs had been found in the Mae Klong river.

"He relentlessly delivered very high-tempo operations, above and beyond that expected of his rank and his peers, with an admirable dedication to his people," reads Lt Cdr Heaton's citation. "His devotion, commitment and professional ability has been extraordinary, and he most strongly deserves official recognition."


Lt Cdr Sean Heaton MBE.
ROYAL NAVY

"This decoration is as much a recognition of the brave, dedicated and immensely professional men and women that were under my command during my time in Southern Diving Group," said Lt Cdr Heaton.

MEANWHILE THE DEATH was announced of another underwater bomb-disposal expert – Colonel the Reverend Robbie Hall, who had been awarded the Queen's Gallantry Medal for neutralising a WW2 German bomb, also in London's docklands.

The unexploded 500kg device had been found by a civilian maintenance diver at a depth of 12m at Beckton Gas Works in 1986.

The then Major Hall of the Royal Engineers, a former Royal Marines Commando, had been off-duty but responded as the only diving officer available.


Col the Rev Robbie Hall QGM.
HOPE BAPTIST CHURCH

It was while working to defuse the bomb in particularly hazardous circumstances that the 30-year-old later said that he found himself praying for the first time. He would go on to become a pastor.

Col Hall later became commanding officer of the Defence Diving School, and his last posting was as commandant of the Defence Explosive Ordnance Disposal, Munitions & Search Training Regiment at Kineton. He has died of cancer at the age of 63.

Mary Rose diver's watch fetches £27,000 – GBR dive-trip beckons

A LONDON DEALER has paid £27,000 for the steel Omega Seamaster 300 Edition watch worn by a military diver while working to raise Tudor warship the *Mary Rose* from the Solent in 1982.

As reported in DIVER last month, former Royal Engineers Sgt-Major Mick Burton had been hoping that the rare Army-issue watch he wore nearly 40 years ago could raise funds to help his three children – as well as paying for a dream dive-trip to Australia's Great Barrier Reef.

Burton had been one of the dive-team that placed the cradle used to raise the *Mary Rose*, a physically demanding operation he likened to "underwater mining".

Only a few of the watches were made for military use, over three years from 1967. Burton logged 180 hours of dive-time around the world from 1974-83 on his, and was allowed to keep it when he left the army because it was broken – he was later able to get it repaired.

Auction house Woolley & Wallis in Salisbury had valued the Omega Seamaster at £20,000-30,000 and, after delays caused by the coronavirus pandemic, it has now been sold along with Burton's army diver's logbooks, badges and a certificate for his work on the *Mary Rose*.

ANOTHER SET OF GHOSTBUSTERS

supporter, international asset-management group DWS.

It will help the volunteers to carry out surveys and recoveries of lost nets, and also take part in events to engage fishermen in ghost-net prevention activities. Healthy Seas director Veronika Mikos said it would also be used for awareness-raising and make operations more efficient "by increasing the number of diving trips per year significantly. Having our own boat is a dream come true!"

Healthy Seas says it has collected more than 460 tonnes of discarded fishing-net since it formed in 2013. Recovered net is recycled by Aquafil into Econyl yarn, from which products such as clothing and carpets are made.

Ghost Diving was formed in the Netherlands in 2009 and now operates internationally.


COR KUYVENHOVEN

Six-hour-drifting divers set to pay

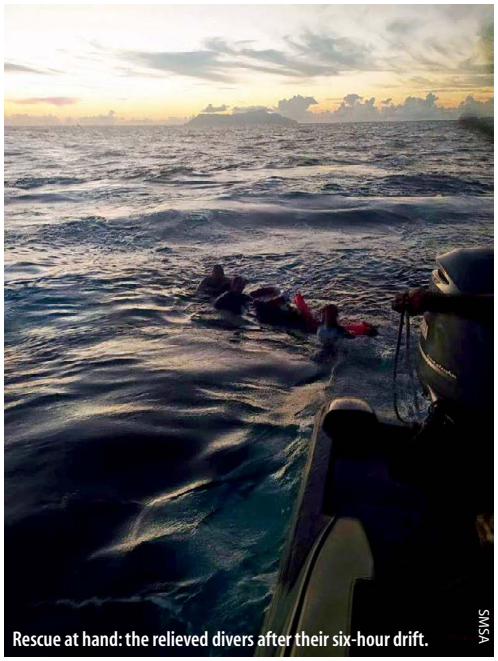
THREE BRITISH scuba-divers along with a South African and a Russian were rescued in the Seychelles on 13 December, after becoming separated from their small boat and spending six hours adrift in the Indian Ocean.

But the authorities criticised the group for not letting them know in advance about their dive plans – and requested that they pay towards the high cost of the rescue operation.

The five had descended in the afternoon at a dive-site north of the main island of Mahe, leaving one other diver to man the boat, according to the Seychelles Maritime Safety Authority (SMSA).

After 20 minutes the group had concluded that the strong currents and poor visibility were making the dive too difficult.

They resurfaced but were unable to see their boat, which had drifted with the current. It was not clear whether they had used an SMB during the dive.



Rescue at hand: the relieved divers after their six-hour drift. SMSA

The diver on the boat had waited for 45 minutes and then called "his representative", who had alerted the Seychelles Coast Guard (SCG).

An extensive search and rescue operation was mounted by the Coast Guard Maritime Rescue Co-ordination Centre, the SMSA and the National Information Sharing & Co-ordination Centre.

Coast Guard boats, marine police, two Zil Air helicopters and an Air Force Dornier aircraft were dispatched to the area, and a number of leisure boats also joined in the search.

The aircraft crew eventually spotted the drifting divers near Mamelles island, some nine miles north-east of Mahe.

They were able to direct the Coast Guard and a leisure boat to the spot, and they picked up the divers some six hours after they had gone missing.

All were said to be in good physical condition, but after being brought ashore they were taken to Seychelles Hospital for routine medical checks before being discharged.

SMSA chief executive Captain Joachim Valmont told the divers that however small their boat it remained their responsibility to notify the authorities of their dive plans in advance.

Speaking to the Seychelles News Agency, he said: "If we had known, we would not have used all our resources for the rescue operation".

Captain Valmont said that during a debriefing the day after the incident the divers had been told about the costs incurred in the search and rescue. "We are in a difficult economic situation with the Covid-19 pandemic and we don't have a budget for such operations," he said. "They agreed to bear certain costs."

SMSA

The moment the divers were spotted.

Stig Severinsen covered eight pool-lengths in open water.

FREEDIVER STIG SMASHES OCEAN DISTANCE RECORD

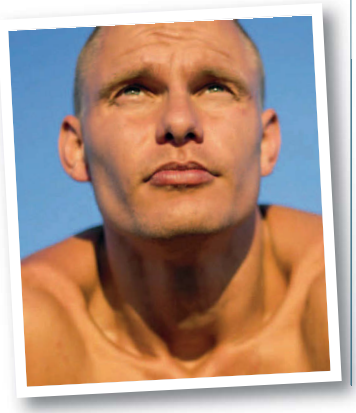
AS A BREATH-HOLD TIME it was relatively short, certainly for Stig Severinsen, but a recent horizontal dive by the veteran Danish freediver has smashed a previous distance record by 25m and was featured in December as a "Record of the Day" by Guinness World Records (GWR).

Severinson, now 48, undertook his "2020 Dive" over a distance of 202.0m to represent the past "wild and challenging" year and to "end it on a positive note".

Using a monofin off the Mexican resort of La Paz in Baja California, he completed the longest open-water dive ever performed on a single breath of air – the equivalent of more than eight lengths of a standard swimming pool. The previous GWR record of 177m – just over seven pool lengths – was set by the Venezuelan Carlos Coste four years ago.

Severinsen and his team were based with British-owned dive-centre Cortez Expeditions for the record attempt.

"It's so amazing to see so many people become inspired by this dive, which is exactly why it is important to set goals and chase your dreams!" said Severinsen. The author of the influential freediving manual *Breathology*, he teaches breathing techniques for both peak performance and for physical and mental rehabilitation.



Considerably longer-distance breath-hold dives have been achieved by freedivers using monofins over the years but under the pool conditions as recognised by governing body AIDA – both Polish freediver Mateusz Malina and Giorgos Panagiotakis from Greece have achieved 300m.

Severinsen is already a long-time Guinness World Records holder and has been praised by the organisation for the difficulties of the challenges he has undertaken.

In October 2013 he achieved two underwater breath-hold distance records in icy Qorlortoq Lake in Greenland – the first while wearing a wetsuit and fins, and the second a day later wearing only swimming trunks. In water temperatures of 1°C, he covered distances of 152.5m and 76.2m respectively at around 1m depth.

GWR says that Severinsen, who has a maximum lung capacity of 14 litres compared to the average 5-6 litres, has contributed to scientific research "by allowing scientists to test and evaluate what happens to his body under extreme physical and mental stress".

"When the world was hit by Covid-19 almost a year ago, I was looking for a way to show that the pandemic was not an excuse to forget our priorities for Nature, or put our ambitions on standby," said Severinsen. "On the contrary – that is why I have spent the time training and developing both myself and my message". His dive can be found on YouTube.

DR ANDREA MARSHALL / MMF

Giant manta first to be declared endangered

Pictured: Giant manta.

Below, from top: Mantas and their gill-rakers in an Indonesian market.

THE GIANT MANTA RAY has become the first manta species to be listed as Endangered. The threat level to *Mobula birostris* has been raised from Vulnerable on the IUCN Red List of Threatened Species.

The Endangered listing covers some 16,000 species that cause grave conservation concerns.

Almost a third of sharks and rays are under threat of extinction. Mantas are now heavily targeted for their gill-plates for use in Asian "medicine", and the Marine Megafauna Foundation (MMF) says this unsustainable trade is having a greater impact on giant mantas than on other manta species.

"The giant manta ray is a classic example of a species that is quickly succumbing to human-induced pressures," said MMF co-founder Dr Andrea Marshall, who was first to identify *Manta birostris* as a separate species and have it recognised as such in 2009. She was also lead author of the IUCN's new assessment.

"When we first assessed manta rays in 2003 there simply was not enough information on the species to determine their conservation status and they were listed as 'Data Deficient'," she says. "But on each subsequent assessment their conservation status increased steadily from Near-Threatened to Vulnerable and now to Endangered."

Being listed under two major international conservation treaties, CMS in 2011 and CITES in 2013, seems to have done little to arrest the species' decline.

Late to reach sexual maturity, the rays give birth only to single offspring every few years, and do little to protect them, so their reproduction rate is too slow to build back depleted numbers. "Manta rays simply cannot withstand such pressures on their populations," says Dr Marshall.

A faint hope could be giant mantas' value as living creatures. "Interactions with manta rays are highly sought after by dive and snorkel tourists globally and contribute millions of dollars to tourism economies each year, particularly in developing nations," said MMF senior scientist Dr Stephanie Venables. "At this pivotal time, recognising their economic value may help to encourage the protection of this enigmatic and now endangered species".

"It is such an honour to have been able to study and describe this species," says Andrea Marshall.

"The realisation that the giant manta ray is now in danger of extinction is a hard pill to swallow. We are still busy learning about this extraordinary creature and have only scratched the surface… but at this stage, we have put that all aside in favour of protecting the last remaining populations of giant mantas across the globe."

Setback for mako shark welfare

THE WORLD'S FASTEST shark, the shortfin mako, has suffered a major conservation setback as the European Union and USA blocked proposals designed to protect the already endangered species.

Makos are dangerously overfished especially in the North Atlantic, with scientists claiming that the population could take 50 years to recover even if fishing stopped today. EU vessels from Spain and Portugal are mainly responsible, with US sports-fishing also contributing to the decline.

The UK has backed a Canadian proposal to ban mako-fishing but the EU and USA failed to support the move.

"North Atlantic mako depletion remains among the world's most pressing shark-conservation crises, yet the EU and USA put short-term fishing interests above all else and ruined a golden opportunity for agreeing a clear and simple remedy," said Shark Trust director of conservation Ali Hood.

Flameshell reef discovery surprises divers

GRAHAM SAUNDERS

AN UNEXPECTED REEF based on the nests of rare flameshells has been found by local scuba-divers off the Isle of Arran in the west of Scotland.

Flameshells (*Limaria hians*) are small saltwater clams with orange flame-like tentacles protruding from their paired shells.

They produce thin but strong *byssus* threads that "knit the seabed together to build a nest that supports a large variety of other marine life," according to COAST (Community of Arran Seabed Trust), the conservation charity that has engaged Arran divers in its citizen-science projects.

Arran is the biggest island in the Firth of Clyde, which once supported seven large flameshell reefs. Only one of these had until now been thought to have survived as a "remnant reef".

Over decades bottom-trawlers and scallop-dredgers were believed to have ripped up the seabed habitat beyond repair, but the newly discovered reef lies in the South Arran Marine Protected Area (MPA), which COAST pushed to be created.

The flameshell reef covers at least 10,000sq m – about the size of 30 tennis courts – says the charity, which describes the discovery as "significant and exciting" for biodiversity interests throughout Scotland.

"Living reefs like this create an important habitat and enhance biodiversity in the area," says COAST, adding that they provide "key nursery grounds for juvenile fish and commercially important scallops" and form "vital blue carbon stores" helping to increase resilience to climate change.

The Clyde's other remnant reef, at Otter Ferry in Loch Fyne, survived only because sub-sea electrical cables made the area too dangerous to fish, and COAST says that 265 animal species have been recorded there.

"This discovery re-ignites the possibility that, with adequate protection, the once widespread Clyde flameshell beds could one day fully recover along with wider marine and fisheries improvements," said marine biologist Prof Jason Hall-Spencer of Plymouth University.

"I cannot commend the community on Arran highly enough for the dogged determination to recover the seas around their island and the wider Firth of Clyde."

18TH-CENTURY WARSHIP DISCOVERED IN AEGEAN

A WARSHIP WRECK believed to date to the 18th century has been found in the Aegean Sea off the Turkish coast at Foça, in the province of Izmir.

Underwater archaeological surveys in the area have revealed five wrecks over the past 15 years. The latest was found by sonar-scanning at a depth of 55m and investigated using an ROV.

Part of the vessel was buried in the seabed but it was estimated to be 35-40m long. Some 20 iron and bronze cannon were recorded, along with cannonballs and hull-timbers.

The nationality of the vessel was unknown, but found aboard was both Italian and Ottoman kitchenware, including plates, jugs, pipes and a reel.

Artefacts recovered are being conserved at Bodrum Museum of Underwater Archaeology.

Foça was a major naval base during the Ottoman Empire era (14th to early 20th century). No sea-battles were known of in the area but experts believe that the wreck might have been a victim of conflict between the empire and Italy – the Ottoman-Venetian War lasted from 1714 to 1718 – or else a pirate ship.

Saipan Grotto lawsuit settled

A WRONGFUL-DEATH lawsuit filed by Madelyn Jones, the widow of US diver John Jones, has been dismissed by the US District Court for the North Marianas Islands in the US commonwealth island of Saipan in the Pacific.

Details of Jones' fatal dive as outlined in the lawsuit were reported in DIVER (*Widow Sues Dive-Pros and PADI, News*, April 2020). The dismissal of the action is understood to have followed a settlement agreed between the parties involved. It was delivered "with prejudice", meaning that the suit cannot be brought again.

Jones had been sent by the US Federal Aviation Administration to help rebuild Saipan's airport after it suffered typhoon damage.

He and a fellow-employee had taken a day off on 18 November, 2018 and booked a dive with two local diving instructors.

According to the lawsuit, neither instructor had questioned Jones about his diving experience, warned him about the potential difficulty of the overhead-environment 30m-plus dive at the Grotto site, or obtained his consent to it.

Jones had subsequently run low on air and gone missing. A full-scale six-day search had proved unsuccessful, and he was officially declared dead the following March.

The suit had been brought against instructor Harry Blalock, owner of local dive-centre Axe Murderer Tours; Joe McDoulett, an instructor from the Green Flash dive-centre; and training agency PADI Worldwide and PADI Americas. The defendants had been accused of negligence, wrongful death, breach of the US Consumer Protection Act and, in PADI's case, vicarious liability, all of which they denied.

Madelyn Jones had been asking for US $75,000 in damages plus costs.

The parties must now pay their own legal costs, and the court retains jurisdiction to enforce their agreement.

Blue whale song reveals lost Indian Ocean population…

A PREVIOUSLY unsuspected second population of blue whales has been identified in the Indian Ocean from their unfamiliar song patterns.

The whales' distinctive sounds were recorded at three locations more than 2000 miles apart, starting in 2017 off Madagascar, then further north off Oman in the Arabian Sea as well as in the Chagos Archipelago in the middle of the ocean. The scientists who made the recordings have just published their study.

Until now the Indian Ocean had been thought to harbour only a single population of blue whales – those encountered by some fortunate scuba-divers in the past off Sri Lanka.

But although all blue whale song is characterised by regularly spaced-out low-frequency repetitions of one phrase, the two sets of sounds didn't match up.

Even without visual or genetic data, the scientists studying the audio recordings are confident that there are at least two distinct populations of *Balaenoptera musculus* in the Indian Ocean, though there might be some overlapping between the two.

JANE B13 / PIXABAY

An unsuspected Indian Ocean blue whale population has been discovered.

Soon after the recordings were taken off the Omani coast, blue whales were sighted in the vicinity. Blue whale song had never before been identified in the western Arabian Sea.

The timing of the whales' presence there suggested that intensive illegal Soviet whaling that saw 1294 blue whales killed in the 1960s had targeted this population rather than, as thought before, the more widely distributed "Sri Lanka" population.

Among the biggest animals ever to have existed, blue whales were hunted almost to extinction before whaling was banned in 1967.

However, the remaining blue whales in the Indian Ocean are thought likely still to be struggling with the combined effects of overfishing, shipping and extraction activities and coastal development.

"The potentially restricted range, intensive historic whaling and the fact that the song-type has been previously undetected suggests a small population that is in critical need of status assessment and conservation action," say the international team of scientists, who were led by Salvatore Cerchio, director of the African Aquatic Conservation Fund's Cetacean Programme.

Their report is published in *Endangered Species Research*.

…AS ANTARCTIC WHALES STAGE A BIG COMEBACK

AN INTERNATIONAL research team has documented the return of critically endangered Antarctic blue whales to the sub-Antarctic island of South Georgia – 50 years after industrial whaling had all but eradicated them.

The Scottish Association for Marine Science (SAMS) and British Antarctic Survey (BAS) based their findings on photographs, underwater sound recordings and records kept over the past 30 years.

Blue whales were abundant off South Georgia before whaling from 1904 to 1971 killed 42,700 animals, most of them before the mid-1930s.

Dedicated whale surveys over 20 years from 1998 revealed only one sighting – but then a survey last February resulted in 58 sightings and numerous acoustic detections.

Preliminary findings from that survey, as well as encouraging reports of a boost in humpback-whale numbers in the area, were reported in DIVER (*Whalers Did Their Worst – But Their Prey is Back*, *News*, April 2020). Opportunities for dedicated whale surveys in the region are limited by its harsh weather and inaccessibility.

AMY KENNEDY / SAMS

An Antarctic blue whale surfaces off South Georgia.

"The continued absence of blue whales at South Georgia has been seen as an iconic example of a population that was locally exploited beyond the point where it could recover," said marine mammal ecologist Susannah Calderan of SAMS, lead author of the report published late last year.

"But over the past few years we've been working at South Georgia, we have become quite optimistic about the numbers of blue whales seen and heard around the island, which hadn't been happening until very recently. This year was particularly exciting, with more blue-whale sightings than we ever could have hoped for."

The team combined its fieldwork with records of sightings reported to the South Georgia Museum by mariners and cruise-ship passengers as well as photographs.

Forty-one blue whales have been photo-identified between 2011 and 2020, though none matched the 517 whales in the current Antarctic blue whale photographic catalogue.

"We don't quite know why it has taken the blue whales so long to come back," said Calderan.

"It may be that so many of them were killed at South Georgia that there was a loss of cultural memory in the population that the area was a foraging ground, and that it is only now being rediscovered."

"With South Georgia waters designated as a Marine Protected Area by the government of South Georgia and the South Sandwich Islands, we hope these increased numbers of blue whales are a sign of things to come, and that our research can continue to contribute to effective management of the area," said co-author and BAS whale ecologist Dr Jennifer Jackson, who led the 2020 whale expedition.

This report is also published in *Endangered Species Research*.

Blaze dive-boat's captain charged

JERRY BOYLAN, the captain of the *Conception* dive liveaboard that caught fire in California in September 2019, has been charged with 34 counts of manslaughter – one for each of the people aboard who died in the blaze.

If found guilty, the 67-year-old could face a maximum 10-year prison sentence applicable on each count. The case will be heard before a federal court.

Last year **DIVER** reported on the USA's National Transportation Safety Board report on the fire, which held fleet operator Truth Aquatics responsible.

All 33 passengers and one crew-member had been asleep below in a single bunk-room with limited means of escape, while the other five crew, including Boylan, had been asleep above deck. There had been no roving nightwatch, contrary to US law, and the captain was said to have failed to arrange fire or evacuation training.

Prosecutor Nick Hanna, US Attorney for the Central District of California, has stated that the captain "was responsible for the safety and security of the vessel, its crew, and its passengers" and had been charged on account of his "misconduct, negligence and inattention to his duties".

The divers were passing the last night of a three-day dive-trip anchored off Santa Cruz Island.

When the captain and crew were woken by the fire they tried to rescue those below but were soon forced by smoke to evacuate the vessel.

"As a result of the alleged failures of Captain Boylan to follow well-established safety rules, a pleasant holiday dive-trip turned into a hellish nightmare as passengers and one crew-member found themselves trapped in a fiery bunkroom with no means of escape," says the prosecutor's statement. "The loss of life that day will forever impact the families of the 34 victims."

The charges have been brought under a 19th-century law aimed at holding sea captains and crew responsible for maritime disasters to account.

The families of all but one of the *Conception* victims have filed legal claims against Truth Aquatics and its owners Glen & Dana Fritzler, who have also turned to an old maritime law in a bid to limit their liability.

VENTURA COUNTY FIRE DEPARTMENT

Burnt to the waterline – the *Conception* liveaboard.

Shark bites diver at Elphinstone

EKREM PARMAKSIZ

Oceanic whitetip shark in the Red Sea.

ANOTHER INSTANCE of unusual behaviour by oceanic whitetip sharks occurred in the Red Sea at the start of December – this time at Elphinstone Reef.

The incident was reported by Red Sea Diving Safari, which operates three eco-villages for divers on the southern Egyptian Red Sea coast.

A group of divers had been taken by speedboat from one of the villages, Marsa Shagra, out to the reef, which is well-known for its shark-diving.

Encounters with sharks including oceanic whitetips (*Carcharhinus longimanus*) occur routinely at Elphinstone and usually in safety.

On this occasion, however, a female diver was "lightly bitten" at the back of her left arm by an oceanic whitetip.

The dive-guide immediately went to her assistance, said RSDS, bringing her and her buddy the short distance to the surface where the boat was waiting.

The skipper helped the divers into the boat and started first-aid procedures while the guide brought the rest of the group back to the boat. He then helped the skipper to treat the injured diver, with assistance from a nearby liveaboard.

The guest was brought back to Marsa Shagra, about six miles away, where a car was waiting to take her to the on-site medical clinic. She was given 12 stitches for two wounds, and the authorities were investigating what might have made the shark bite.

"Encounters with sharks are almost always without incident," says RSDS. "We must accept that as humans we are entering their territory and there are risks involved with encounters with wild animals. We can reduce those risks by behaving appropriately but accidents can still happen."

Another incident involving an oceanic whitetip shark is reported to have occurred at the same location four days earlier, with a diver sustaining minor injuries.

In December **DIVER** reported that Ras Mohammed national park had been closed for recreational activities pending investigations, following an oceanic whitetip attack on a group of snorkellers. A 12-year-old boy and his mother from Ukraine had been badly injured and their guide had lost a leg.

Last month in **DIVER** Ekrem Parmaksiz reported on the abnormal *longimanus* behaviour he witnessed on a recent trip to the Brothers Islands. He believes, along with many dive professionals he has questioned, that rises in Red Sea water temperature could be responsible.

MYSTERY WHALES OFF MEXICO

RESEARCHERS WORKING with the Sea Shepherd Conservation Society have captured footage and genetic samples of an unidentified whale species near the remote San Benito Islands off Mexico's Pacific coast.

The team of beaked-whale experts had set out to investigate an unidentified acoustic signal recorded in the area in 2018. Like all cetaceans, beaked whales emit echo-location signals unique to each species.

There are 23 known species and it had been thought that the signal might have come from a Perrin's beaked whale, a species never before seen live.

Three beaked whales were spotted surfacing from the Sea Shepherd vessel *Martin Sheen* – but they were not Perrin's.

The scientists obtained photographs and video recordings above and below the surface and recorded acoustic signals using an underwater microphone. They said they were "highly confident" that they had found a new whale species, and genetic samples taken from the water were expected to provide the proof once analysis was complete.

"We saw something new," said Dr Jay Barlow. "Something that was not expected in this area, something that doesn't match, either visually or acoustically, anything that is known to exist.

"It just sends chills up and down my spine when I think that we might have accomplished what most people would say was truly impossible – finding a large mammal that exists on this Earth that is totally unknown to science."

SEA SHEPHERD

Unidentified beaked whales.

SUSSEX SHIPWRECK SET TO SAIL TO AMSTERDAM

ZLA

Cutaway view of the planned Docking the *Amsterdam* museum.

AN AMBITIOUS underwater museum called Docking the *Amsterdam* is to be built in the Netherlands to house the wreck of the historic shipwreck that now lies in the bay of Bulverhythe near Hastings.

The 40m-long wreck is reckoned to be the best-preserved Dutch East India Company ship ever discovered.

It was returning from Batavia (now Jakarta) with a mixed cargo on its maiden voyage on 26 January, 1749, when it lost its rudder in a Channel storm and was wrecked on the Sussex coast.

The ship's 335 crew and troops escaped unhurt and some contents including chests of silver coins were salvaged. Lying in an area with a wide tidal range and strong currents the *Amsterdam*'s superstructure was subsequently destroyed, while its hull and remaining contents sank 8m into the sand and clay to remain largely intact.

The wreck was rediscovered in 1969 when its ribs were exposed by a low spring tide, and some excavation work was carried out by scuba-divers in the mid-1980s.

Some of their finds can be seen at the Shipwreck Museum in Hastings.

Designated a Protected Wreck since 1974, the *Amsterdam* is managed by Historic England.

The new museum, to be built in the city that gave the ship its name, has been commissioned from architectural studio ZLA by the VOC Ship Amsterdam Foundation, which has unveiled the plans to relocate the wreck while keeping it preserved under water.

The *Amsterdam* will be lifted from the seabed in one piece using a huge steel "salvage dock" or basin, retaining as much sediment and water around it as possible.

The dock will then be sailed to a site in *Amsterdam* where the ship can be kept in a glass tank, surrounded by a fabric canopy that appears to be modelled on a sea-urchin shell.

Visitors will enjoy 3D views, including from an overhead walkway, and be able to watch as maritime archaeologists investigate the wreck in their secure environment.

Surrounding galleries will contain recovered artefacts and are promised to highlight the story of the Dutch East India Company, including its involvement in slavery.

Laboratories and training spaces for the archaeologists will be included but hidden from public view.

The project is expected to be completed by 2025.

ZLA

Docking the *Amsterdam* as it should look in 2025.

Freda's Diver Dishes

February is here and we're getting closer to the dive season in the UK, though I know some of us will still have been diving throughout the winter months! I made these brownies while reminiscing about diving the RMS *Laurentic* when we operated in Northern Ireland. It's a fantastic dive that we were lucky to have as a back-up when we couldn't get out to the deeper offshore shipwrecks.

You can enjoy these brownies either after a dive or during a dive-planning meeting with your club or dive-buddies. They're divine, absolutely delicious, and they take literally only 10 minutes to prepare and 25 minutes to bake in the oven. These chocolate brownies also just happen to be vegan. They can easily be gluten-free too.

Chocolate Caramel & Chia Seed Brownies

Ingredients

120g dark chocolate; 60g coconut oil; 2 tbsp ground/milled chia seeds; 60ml dairy-free milk; 2 tsp caramel essence/extract; 1 tsp vanilla paste; 80ml coconut yogurt; 80g castor sugar; 60g self-raising flour (or gluten-free flour); 1 tbsp cacao or cocoa powder; 1 tsp baking powder; quarter tsp salt; 100g ground almonds.

Method

Mix the chia seeds, milk, coconut yogurt, caramel and vanilla together in a small bowl, then set aside. Set your oven at 180°C.

Melt the coconut oil and chocolate in the microwave on full power for a minute, stir with a metal spoon, then microwave for another minute and stir until completely melted. Add the chia seed mix and all other ingredients to the melted chocolate and coconut oil and mix well using a metal spoon. Tip the mixture into a lined 20 x 15cm oven tray.

Bake in the oven for just 25 minutes. Insert a cake skewer into the middle of the cake to check. If it comes out clean it's ready. Leave to cool for 10 minutes, then lift out of the baking tray using the sides of the paper and place on a wire rack. Cut into 8-10 pieces and dust with icing sugar, cacao or cocoa powder. Then enjoy with a cuppa after a great dive with your buddies.

Top Tips

If you weigh all your ingredients before you start this recipe, it takes no time at all. These brownies make a great dessert, served warm with fresh raspberries and ice cream. Just 20 seconds in the microwave is all they need.

✷ Freda Wright is a diver and chef on British diving liveaboard mv *Salutay*. Find more of her recipes in the book *40 Dives 40 Dishes*. It costs £16 plus £1.95 postage. £1 from every sale goes to Oceans Plastics Greenpeace, salutay.co.uk

Russian divers find barge, ship's gun and 80-year-old milk-bottles

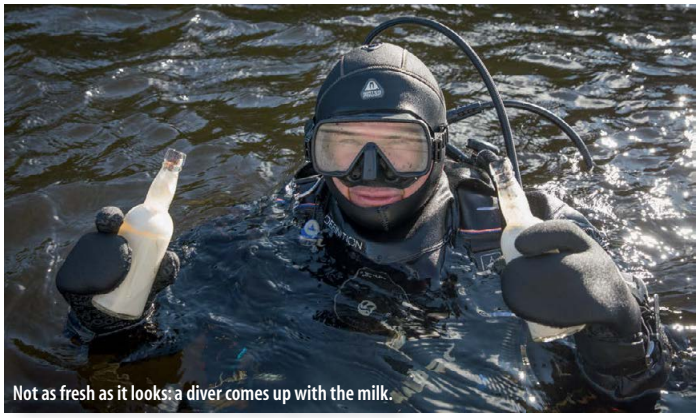
RUSSIAN DIVERS who discovered a World War Two steamboat in a lake in 2019 (*Russian Divers Make Unique Lake Find, News*, March 2020) have found bottles of milk on the wreck – and also found a barge and a ship's gun on a return expedition to the country's second-biggest lake, Ladoga.

The divers from the Divo club in Oryol originally located the 19th-century steamboat *Walomon Luastari* (*Valaam Monastery*) at depths of 7-9m in 2017 while trying out side-scan sonar in preparation for a marine expedition.

They were unable to dive it until two years later, but during that time they had studied what was known about the lake's wrecks.

The well-preserved wreck had yielded dishes from the galley, a gimbal from a gyrocompass and two navigation lights, and the divers had been able to confirm its identity.

Cold and murky, Lake Ladoga lies in Karelia bordering Finland and includes the island of Valaam, where the 30m vessel was found. Built in Sweden in 1860, it had carried goods and passengers in the Baltic before being transferred to the lake in 1931.


Not as fresh as it looks: a diver comes up with the milk.

Requisitioned by the Finnish navy during WW2, it was being used as an unarmed transport vessel when it was sunk in Nikonovsky Bay by three Soviet bombers on 22 January, 1940. The crew survived.

Last August a third Divo expedition to Lake Ladoga began with a blessing by monks from the Valaam Monastery that gave the vessel its name, club-member Stanislav Trofimov told **DIVER**.

A side-scan sonar search was carried out around Kilpola island for traces of a Soviet troop evacuation in August 1941 that gave one of its inlets the name Bay of Death. At depths of 9-11m the divers found a 10m barge with its deck missing.

Around it was ammunition and finds that included a wagon wheel, boots and a horse's harness.

The second part of the expedition took place on an anomaly detected around the lake's Defence Islands.

A dive revealed this to be a well-preserved piece of artillery, identified as a 70-L 37mm anti-aircraft gun as used by the Soviet Navy after 1940.

"This discovery was a big surprise – perhaps the key to opening a new mystery," said Trofimov.

The dive-team then returned to Nikonovskaya Bay to dive the *Walomon Luastari* where, despite problems associated with erosion of the lower decks, they came across several sealed bottles of what appeared to be milk.

These were presented to the local monks, who believed that it had been produced at a farm on the island.

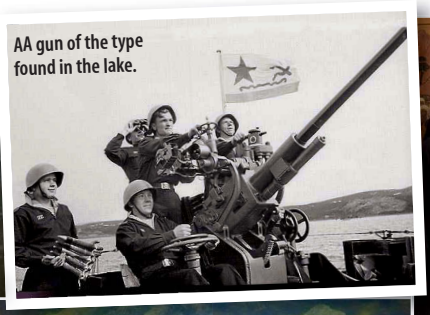
The divers were convinced that the blessing at the start of their trip explained the warm temperatures and good diving conditions they enjoyed throughout the expedition.

And they say that talking to the monks at the Valaam monastery museum has now inspired them to launch a new expedition in the area.

While evacuating the island during the war the monks had been unable to fit bells taken from a belfry into their car, so had left them on the ice.

When the ice had later melted, the bells had sunk to the lakebed – and the divers' next mission is to


Gun barrel.


AA gun of the type found in the lake.


Divers at the Valaam Monastery.


Artefacts from the barge.


Barge wreckage.


Unexploded mine.


The expedition boat.

STANISLAS TROFIMOV / DIVO

Hunt-boss octopuses throw their weight about

SIMON GINGINS

Big blue octopus works to keep its temporary hunt party to heel.

OCTOPUSES ARE known to "punch" fish to keep them in line as hunting partners, but a research team has observed them lashing out from what they think could simply be spite.

The researchers, led by marine biologist Eduardo Sampaio from the Marine & Environmental Sciences Centre of the University of Lisbon in Portugal, had been studying how Red Sea octopuses work with various coral-reef fish to hunt and trap prey.

Grouper and other species habitually form mutually beneficial hunting collaborations with octopuses. These organised hunts can involve multiple partners from several species and last for more than an hour.

Octopuses play the central role, pursuing prey inside rock and coral crevices, with grouper signalling promising locations to them. Bottom-feeding fish partners such as goatfish scour the seabed while semi-benthic predators such as cornetfish patrol higher in the water column (*above*).

Sometimes opportunistic fish such as tailspot squirrelfish join in to pick up whatever they can rather than to contribute to the group effort, and as such are likely to be victims of octopus punching. But conflicts also arise between the "official" partners over their level of investment or the distribution of rewards. It's usually when the relationship becomes unbalanced that octopuses lash out in a bid to re-establish control.

The scientists observed interactions at sites in El Quseir in Egypt and Eilat in Israel in which different big blue octopuses (*Octopus cyanea*) delivered "a swift, explosive motion with one arm directed at a specific fish partner, which we refer to as punching".

The recipients were not only squirrelfish but blacktips, lyretail grouper, yellow-saddle and Red Sea goatfish and half-spotted hinds.

The action was observed either to force the fish to reposition itself, to deter it from eating the prey or to expel it from the group altogether.

But on two occasions, one involving a goatfish and the other a grouper, the researchers recorded punching that seemed unrelated to the group's hunting activities. They believe this behaviour could have been a warning that in any future collaboration the fish should know its place – or else was motivated purely by spite.

The team hope to find out whether certain species of fish are punched more than others, and whether collaborative fish behave similarly towards each other. Their research, including video of the eight punching events, is published in *Ecology*.

Picture of His Life **Remarkable documentary about big-animal u/w photographer Amos Nachoum as he battles to dive with – and capture stills of – polar bears! This moving film frames the fearless diver's singular career and is cash well spent – go to pictureofhislife.com**

The Third Dive **This outstanding new book by Robert Osborne is a deep dive into the death of *Sharkwater* film-maker Rob Stewart off the Florida Keys in 2017. It presses many buttons… review next month.**

Underwater World Records **Just as there seems to be no limit to people's ingenuity, neither is there one to their craziness. This 8min YouTube video of underwater madness from Guinness World Records proves that. The depth record isn't included (see *Beachcomber*).**

Falklands Wrecks **Check out the new website dedicated to historic shipwrecks around the Falkland Islands, including recently discovered German WW1 cruiser SMS *Scharnhorst*. Created for the Falklands Maritime Heritage Trust, you'll find it at fmht.co.uk**

5000TH MANTA IDENTIFIED

BETH FAULKNER / MANTA TRUST

IDENTIFICATION OF the 5000th reef manta in the Maldives was cause for celebration for UK charity the Manta Trust's pioneering Maldivian Manta Ray Project (MMRP) in December – and it offered one supporter the chance to name the landmark ray in a competition. The male juvenile (*above*) was duly named Steeno (after rugby fly-half Gareth Steenson).

The Maldives hosts the world's biggest population of reef mantas (*Mobula alfredi*). The MMRP has been studying them for more than 15 years, and in the process has created the world's biggest manta database.

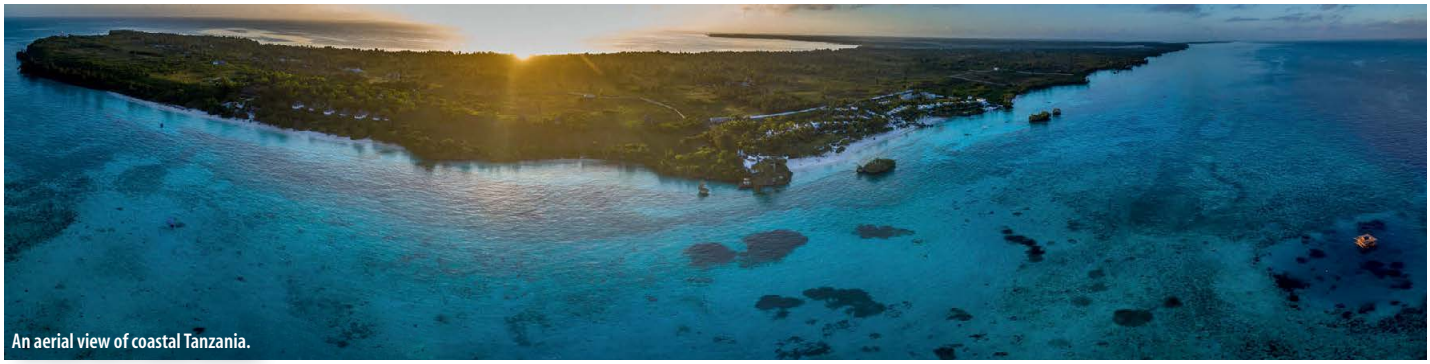
Many of the ID shots were submitted through citizen-science programme IDtheManta.

"It's a testimony to the hard work and dedication of all our researchers, interns, citizen-scientists and collaborating tourist operators in the Maldives," said project manager Tam Sawers of reaching the 5000 mark.

The MMRP is said to have helped achieve national protection for the rays by driving the designation of two manta-focused Marine Protected Areas in 2009, and to have spearheaded the addition of all ray species (including manta and devil rays) to the Maldivian National Protected Species List in 2014.

The MMRP has also helped to develop the first scientifically advised best-practice code of conduct for manta-ray tourism, says the trust, while its Marine Education Programme has reached hundreds of local students to inspire the next generation of Maldivian ocean ambassadors.

The project also provides science-backed recommendations for policy changes in other countries in which manta and devil rays are vulnerable.


An aerial view of coastal Tanzania.

MICHAEL MARKOVNA / WCS

Surprise coral sanctuary revealed in Indian Ocean

A RARE INDIAN OCEAN "climate refuge" for coral has been discovered off the coasts of Kenya and Tanzania – but the East African marine-life sanctuary is already seen as under threat from human activities.

A scientific study revealed the small area of coral reef, which the researchers have hailed as a "jewel of biodiversity".

Its location in an oceanic "cool spot" has helped to protect large populations of corals and marine mammals from the climate change affecting other areas, according to the Wildlife Conservation Society (WCS).

The WCS, which has been studying coral reefs for more than 70 years, hopes that the coral sanctuary can now be protected. The region has suffered historically from reef-destroying practices by both national and international fishing fleets, and current coastal-development plans include a port in northern Tanzania to serve a new oil pipeline.

"Coral sanctuaries are regions where reefs have the best chance to survive climate change," said lead WCS coral scientist and the study's author Dr Tim McClanahan.

"Scientists are scouring the world's oceans to find and protect them.

"Our study shows that while warming waters may devastate surrounding reefs, this area could become an incredibly important sanctuary where marine species big and small will flock to find refuge from climate change.

"If well-protected, this key trans-boundary marine ecosystem will remain a jewel of biodiversity for the entire East African coast."

The sanctuary lies in a coastal basin formed by post-Ice Age meltwater from Mt Kilimanjaro and the Usambara mountains, with its deep channels giving it thermal stability. It provides a refuge for threatened sharks and rays, spinner dolphins and dugongs among many other species.

"If protected, this region has the capacity to continue to provide immense value as a global tourism destination, a hotspot for biodiversity, and a critical source of sustainably derived food and cultural heritage for generations to come," says WCS.

The study has been published in *Advances in Marine Biology*.


Anemones in the Tanzanian sanctuary.

MICHAEL MARKOVNA / WCS


Healthy reef and soldierfish.

SIMON PIERCE / CORAL REEF IMAGE BANK


Coral bommie.

GABY BARATHIEU / CORAL REEF IMAGE BANK

ABU DHABI WHALE SHARK TEAM RESCUE PROVES A SUCCESS

A 6M WHALE SHARK that found itself trapped in a man-made lagoon on the island of Abu Dhabi, capital of the UAE, was rescued and returned to the Arabian Gulf in early December.

The animal, which could not feed while unable to find its way out of the Al Bahiyah lagoon, was rescued by a combined team organised by the Environment Agency of Abu Dhabi . Supported at the surface by jet-skiers from Abu Dhabi Marine Club, National Aquarium scuba-divers captured the whale shark and placed it in a soft plastic through-water transport bag.

It was then towed by boat some 12 miles out into open water, with frequent stops to allow the divers to monitor its vital signs.

Described as a "first of its kind" capture-and-release effort for Abu Dhabi, the whale shark was reported to have been released without showing any signs of harm.


The whale shark is towed out to sea.

EAD

SCUBA SAM DIGS DEEP

Scuba Sam is back, or are back, because there is more than one Sam. If you've missed this saga – and DIVER has been waiting to see how it plays out – SS is a team of disgruntled technical divers who don't believe that Egyptian ex-military diver Ahmed Gabr actually dived to 332.25m in 2014 to break the world depth record.

They have been going to impressive investigative lengths to amass evidence to support their case – it's complicated, but you'll find it all on their Facebook – and have called on Guinness World Records to investigate. So far, however, GWR has remained tight-lipped.

Latest is that SS report that Gabr has been employed by GWR as a record adjudicator. Indeed there is a picture of him in a blazer in Jordan in 2016 signing off, bizarrely, on the world record for the biggest mosaic ever to be made out of biscuits. Crumbs!

SS reckon that an issue with Gabr's own record would call into question any that he had adjudicated, biscuits and all. They have also alleged that GWR keeps the records of its records for only a couple of years, and that as an adjudicator Gabr would know that.

Because Scuba Sam say that GWR is ignoring them, Beachcomber checked in with its press office.

It was quick to confirm that it was conducting as "top priority" a review seeking "expert and impartial contributions from outside of GWR" on the matter. Its findings would be published on completion, though it couldn't give a date for this.

It insisted that it retains "all relevant evidence relating to the approval of record titles, in accordance with our documentation retention policies", without specifying how long those policies meant the evidence was kept.

It's an interesting one – diving depth records are notoriously difficult to verify and have left many previous claimants frustratingly open to claims of duplicity. I'll follow this with interest and keep you informed.

Bay watch

Amateur mariners who like to hang out in Dorset's Studland Bay have been getting the wind up about the Marine Management Organisation's consultation on proposals for managing the Marine Conservation Zone there (*that's it above, on a quiet day*).

They fear they're likely to be banned from anchoring in the bay as a result and, while I'm sure they're all Nature-lovers, I suspect they're not losing sleep about the fate of a few endangered seahorses that also like to anchor (by their tails) in the seagrass – the cause of the kerfuffle.

I say a few, but in fact the long-snouted seahorse population prospered mightily under lockdown. Seahorse Trust divers found an incredible 16 on just one dive.

Before the diving community takes too much pleasure in the yachties' discomfort, bear in mind that unlicensed scuba and snorkelling in the bay could be ruled out of order as well. We'll have to wait and see.

Park life

With its long chain of purpose-sunk shipwrecks and other human-made attractions, one might think Florida's Atlantic coast is already a vast artificial reef, but enough is never enough.

The latest plan is for the Reefline, a seven-mile concrete underwater sculpture park off Miami Beach.

"Artist-designed and scientist-informed", the installation (*below*) is designed to fight the good fight against climate change and "attract ecologically-minded tourists and art-lovers to Miami". It will cost a million bucks, and that's just phase one.

Environmental lawyer Seth Jaffe was, I felt, a tad cynical about this exciting news: "Given how often parts of Miami Beach are now under water during high tides, even in the absence of extreme weather, I think that they could save some money by just waiting a few years," he suggested.

"At some point in the not-too-distant future, climate change will put Miami Beach's existing parks under water," predicted Seth.

"They won't have to build an expensive new park in the ocean, and the existing parks will be much more convenient for the residents to use."

Rewards row

Remember Sam & Jared, the two amateur divers I mentioned in December? They drive around the USA recovering missing bodies, cars and other property from inland waters.

While they say their satisfaction derives from the closure they bring to grieving relatives – and satisfying the appetites of their YouTube followers – could there also be an element of bounty-hunting to their activities? Well, guys gotta eat.

Recently in Hampton, Iowa, they located the remains of Ethan Kazmerzak in his VW, about 2.5m deep in a small gravel pit.

Ethan, 22, had gone missing after a night out with friends seven years before, his disappearance baffling cops who had searched the water at the time.

A $20,000 reward had been offered to find him – raised to $100,000 in 2015.

The anonymous donors (not the family) now claim that their reward offer expired that year, though a local police chief is said to have told press recently it was still valid.

The diving duo say that although they didn't find Ethan for the cash they feel entitled to it nonetheless. They plan to sue for breach of contract "to uphold the integrity of all rewards across the nation".

There's nothing with so much integrity as a reward, is there? So much for closure.

OMA

Homo robocopus aquaticus?

A microscopic robot made up of billions of atoms designed to act as a receptacle for oxygen and carbon dioxide – that's a respirocyte.

We don't know whether these actually exist in a high-security lab somewhere, but there has been much gossip recently about a hotting up of the international race to develop *Homo robocopus*, a breed of bionic supersoldiers engineered through DNA manipulation to wield extraordinary powers.

Among those powers is the ability to operate under water for long periods without need for scuba.

That's where the – I stress hypothetical – respirocyte comes in. Each of those tiny robots would be a synthesised red blood cell with the ability to transform a military diver into half-human, half-fish.

If the headlines are to be believed, France has now joined the USA, Russia and China in this chilling robocop race. As far as we know the British Army is still preoccupied with the inadequacy of its artillery, never mind re-engineering the troops.

But, as with rebreathers and dive-tables, where the military goes civilians tend to follow.

Will we divers be queuing up not for air-fills but for respirocyte injections in a few years' time?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OUR EUROPEAN TOUR Pt 3

They won't let a pandemic stop the tour – in fact despite the hurdles the diving seems to be getting better and better for Swedish film-makers LINN VENNBERG and MATTIAS GRANBERG as they hit the Iberian peninsula. If you haven't dived there, you might be in for a surprise…

THE SAME MORNING we were preparing to board the ferry from Dover to Dunkirk, Storm Francis blew in over the UK and France.

Our ferry was able to cross the Channel as scheduled and on the other side we set up camp to wait out the storm until we could go diving.

As in Normandy earlier, we found a dive-club with some helpful members who offered to take us diving.

Considering the recent storm our expectations were pretty low, and once in the water we discovered that the visibility was so poor we could barely see the wreck or each other. Taking photos or video was out of the question.

We still had a good day and got close topside views of the local dolphin, which usually lives around one of the area's wrecks. And a day spent at sea in good company is always a good day. We'll have to come back to dive in better conditions.

After that unlucky second attempt to dive the WW2 wrecks of France, we headed straight for Peniche, Portugal, and our scheduled diving in the Berlengas marine reserve. This consists of three island groups, the main island Berlenga Grande, Estelas and Farilhões-Forcadas.

Most of the diving is done around Berlenga Grande, and between dives it's possible to go ashore to explore the island, relax at the beach or have lunch at the restaurant. The smaller outer islands are less frequently dived because they are more exposed.

There are a lot of scenic caves to explore around Berlenga Grande. Our favourite dive was one of the bigger ones, inhabited by a huge school of inquisitive grey triggers.

Entering the darkness to find ourselves surrounded by the fish in their hundreds moments later was a surreal experience. We spent two entire dives exploring their home and getting acquainted.

Other than that there are a lot of octopuses at dive-sites around the island and we also saw cuttlefish and schools of sea bream. At one site we spotted six John Dorys – they are residential, so it's almost guaranteed to see them at the site.

We also made it out to Farilhões-Forcadas one day and dived a beautiful wall covered in purple gorgonians.

As a bonus, a pod of dolphins swam along beside the boat, jumping and playing in the waves on our way back on the last day. They are a common sight in this area and it was a perfect way to end our stay there.

Another highlight of Berlengas were the warm showers offered at the dive-centre. At the start of our stay in the UK camp-sites had still been closed, and when they opened they had been booked up wherever we went. In France we had found the same thing – which was why we had decided that we would never again take a proper hot shower for granted.

We do have a small outside shower with the van and the UK is full of nice lakes to swim in so we had managed to wash ourselves over the past two months, but it's not the same as a hot shower with good water pressure.

Especially on cold, rainy days.

AFTER MANY GOOD dives and almost as many hot showers we continued through Portugal to Sesimbra to dive in the Arrábida marine reserve.

The sheltered location provides good conditions for diving year round.

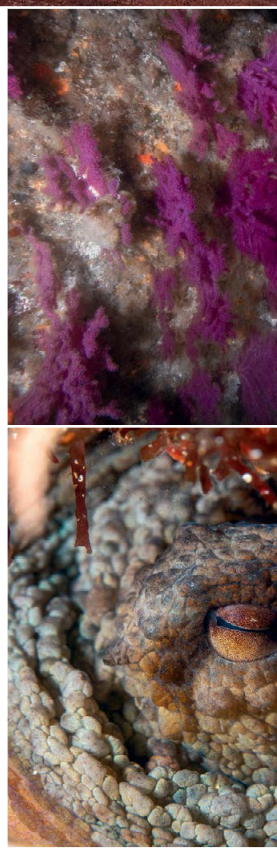
On the first day we dived two spots near the reserve's central zone, where no activities, including diving, are allowed. The big boulders making up the reef were covered in gorgonians of various colours and other growth.

Around them we found many species of fish, nudibranch and octopus. The Arrábida reefs are full of life.

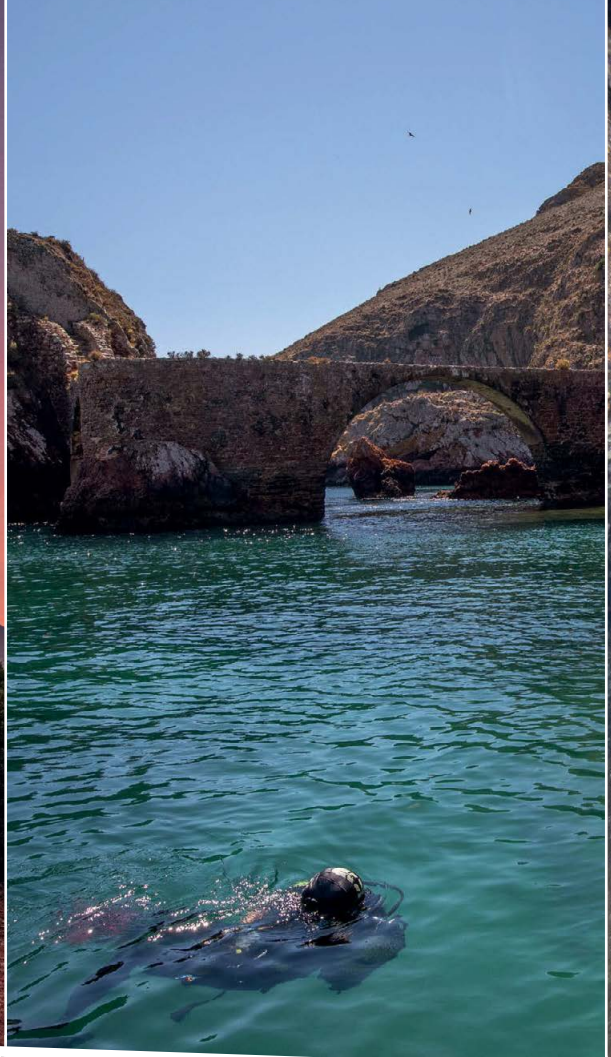
The next day we headed in the other direction, west from Sesimbra, to explore the wreck of a Nigerian cargo ship that sank a mile off the coast outside Cabo Espichel in 1989.

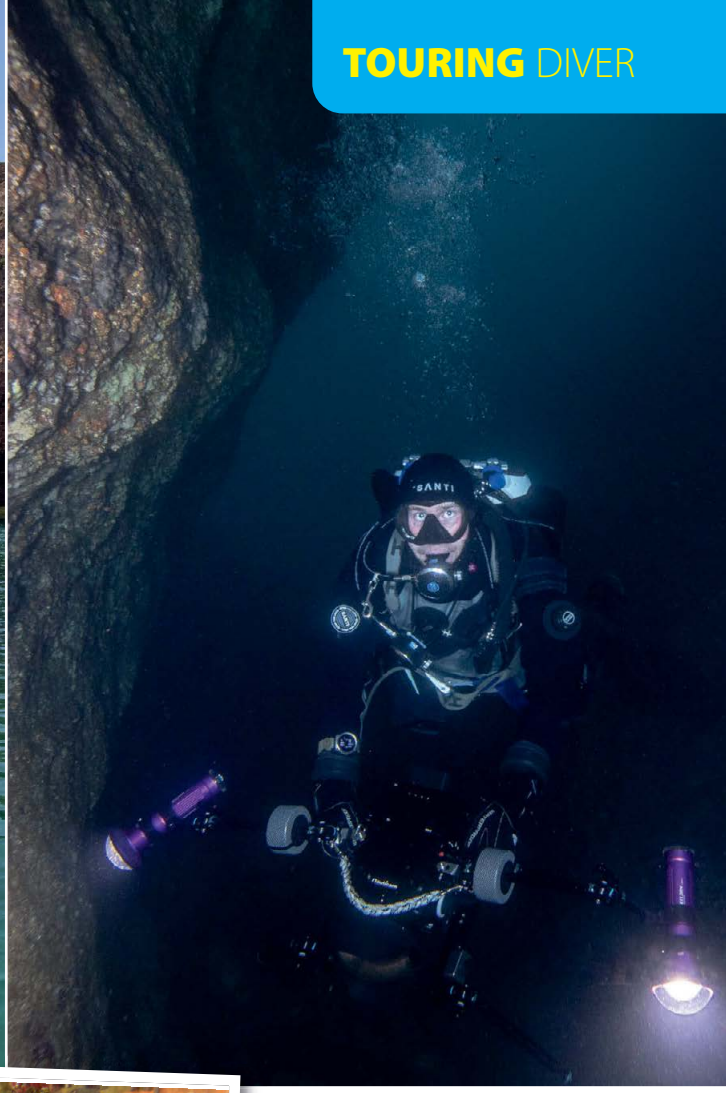
The *River Gurara* wreck lies in two pieces a little apart. The bow is deeper so we started there.

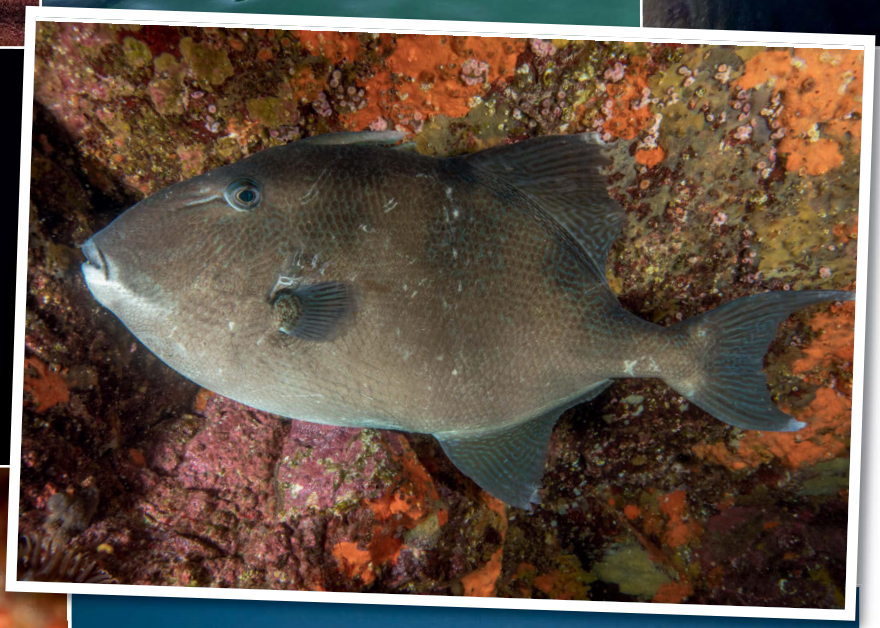
The surface current was so strong that we had to pull ourselves along a line to the front of the boat to reach the descent

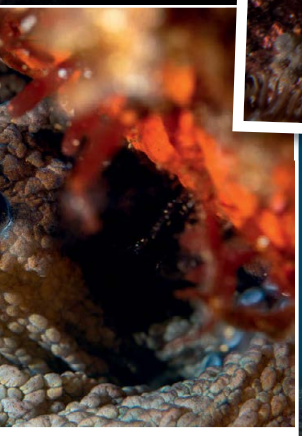


Top row, from left: Parked at Cabo Espichel; at Berlenga Grande; cave at Farilhões-Forcadas.









Above, clockwise from centre left: Gorgonians at Farilhões-Forcadas; grey triggerfish at Berlenga Grande; Arrabida marine reserve; Berlenga octopus.

line; hard work carrying the camera.

Once down the current slowed and we had no problem making our way around the bow.

The bigger part of the wreck is quite intact, resting on its side and covered in gorgonians. There are also some swim-throughs and places to enter the wreck.

For the second dive we moved to the more broken-up stern, where the propeller and parts of the machine house can be seen. It's a well-inhabited artificial reef, and we found both conger and moray eels, octopuses and both zebra and common two-banded sea bream.

It's an interesting spot whether you prefer wrecks themselves or marine life.

OVER THE FOLLOWING weeks we explored the coast and beaches of southern Portugal and the winding mountain roads in Andalucia, Spain.

We visited the historical cities Alhambra and Ronda and took in the beautiful scenery in Sierra Nevada before making our way to our next diving destination, Cabo de Palos.

Outside the little fishing village lies a European hotspot, the Islas Hormigas marine reserve. Our anticipation was set so high that we were trying to dampen it to avoid disappointment as we loaded the boat for the first dive.

It took only minutes to reach the dive-site and once the boat was attached to

the buoy – no anchors are to be used in the reserve – we began kitting up.

As in Sesimbra, the current at the surface was strong. We grabbed the line, pulled ourselves to the front and began descending. In the clear water we could see the pinnacle rising from the depths.

Once down we started pushing against the current around the wall but we didn't have far to go. Within a minute we were in the middle of a school of bogue.

In autumn these fish gather in large schools in shallow waters and Islas Hormigas is the best place to experience this phenomenon. And where there are bogue, there are predators.

First to appear was a school of barracuda, slowly cruising by. They allowed us to swim beside and be surrounded by them as they inspected us.

Later a school of greater amberjack suddenly appeared and swarmed around us for several minutes before vanishing along the reef as fast as they had appeared. Common dentex swooped across the reef and mackerel were singling out and chasing the bogue with astonishing speed.

The reef was also patrolled by so many grouper that it was pointless trying to count them. Cabo de Palos and one other reserve are the places in Spain to find the largest numbers of grouper.

AFTER THAT FIRST DIVE, we concluded that we needn't have worried that our expectations were set too high. This site had exceeded them.

For two weeks we dived around the reserve, and every dive was as spectacular as the first. The grouper were always there in large numbers and the dive-centre staff said that they could pretty much guarantee seeing them. We saw barracuda and common dentex on every dive.

Mackerel frequently swirled by, and at one site we were surrounded by greater amberjack hunting bogue near the surface throughout our safety stop.

One day we dived the wreck of the *Isla Gomera*, which sank in a storm in 1946. It is commonly known as El Naranjito – "little orange" – because of the citrus cargo it was carrying at the time. The fruit continued to wash ashore for weeks.

The wreck is quite intact and upright. It starts at 28m, so we would recommend diving it with nitrox. With air the bottom time was very limited and we didn't manage to see that much of the wreck – though, as photographers/videographers, we do tend to move slowly.

Because we were staying for a while in Cabo de Palos we took the opportunity to have some things sent from home, but the package had yet to arrive when it was time to leave. We waited a couple of days, but eventually had to move on because we had only two days to get to L'Estartit.

The dive-centre kindly offered to send the package on. Of course, it arrived at the centre the day after our departure.

L'Estartit means the Medes Islands marine reserve – the place where, seven years earlier, we had taken a camera under water for the first time.

We had been in Barcelona and took a day out to do two dives around the islands. With only 20 dives or so under our belts, Mattias had invested in a GoPro with a head-mount.

About 10 minutes into the first dive, I had discovered that there was no longer a camera on his head, and we had traced our way back to the descent-line to find it lying on the bottom.

Tip to aspiring videographers: don't mount a camera on your head until you have learnt to manage your buoyancy and can focus on additional equipment!

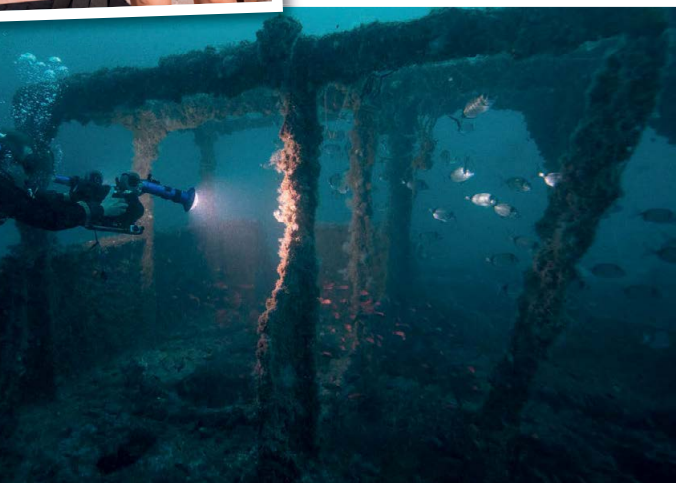
The resulting footage had not been the best, but processing it had sparked an interest that led us to keep learning and evolving. We still learn something new to help us improve with every dive.

This time our first dive was at La Vaca, a tunnel covered in purple gorgonians. You can swim through it to the other side of the island. Around it swim big grouper accustomed to but still inquisitive about divers. One swam up to me to inspect my camera and, after a while, decided to taste my diffuser, a white plastic disc hanging from the strobe. Eventually classifying it as inedible, it let go and swam away.

Top row, from left: The van in the Pyrenees; Islas Hormigas barracuda; common two-banded sea-bream; trying to capture the sheer abundance of fish life.

Above from left: The Acuasuboeste dive-boat; Islas Hormigas school of bogue; grouper.

Below, clockwise from top: Mattias and Linn at Sesimbra; *El Naranjito* wreck; greater amberjack at Islas Hormigas.



The second day we dived in a channel between two of the islands. In the shallow part, where the seabed slopes down on each side of the islands, we found hundreds of big barracuda, stretching from the bottom to the surface.

Visibility near the seabed was not the best but closer to the surface the water cleared and we could enjoy these big predators' company.

Floating around inside a school of barracuda is, in our opinion, one of the best experiences in diving.

For the afternoon dive we swam past a wall covered in purple gorgonians, saw a school of cow bream, got close to more grouper and were once again surrounded by a school of greater amberjack.

The way they appear out of nowhere and surround you before disappearing into the blue again is impressive.

On the last day we dived on the other side of the channel and decided to see if we could find the barracuda again.

On our way we saw more grouper, greater amberjack and common dentex – and we did find the barracuda again.

Friendly as usual, they allowed us once again to swim in their midst, giving us a glimpse of what it's like to be a barracuda.

TALKING TO PEOPLE working in the tourism industry in Spain, it was clear that the pandemic had affected many of them indirectly. We were told at one dive-shop that it had lost around 60% of its income for the season. What seemed to have saved dive-centres was the number of local people who had done their open-water course and discovered scuba.

The restaurants had also been forced to close again as we arrived in Catalonia, so we knew what a hard time owners and their employees were having.

We had finished diving the Islas Medes but still had to wait for our package to catch up with us. It took four days before we could continue our journey into the Pyrenees to enjoy the beautiful autumn colours in the mountains.

At higher altitudes the leaves started shifting their colours and the scenery was amazing. We hiked in the mountains on the Spanish side for a week, our plan being to continue to explore the French Pyrenees before heading back down to the coast towards Italy.

But once again Covid-19 forced us to change our plans. France was beginning to close down, and eventually decided to return to nationwide lockdown.

So as we write we are still in Spain to await developments in France and Italy, while trying to isolate ourselves as much as possible. Follow the journey on Instagram (@ocean.exposure), Facebook and YouTube (@Ocean Exposure).

WE DIVED WITH...

ACUASUBOESTE in Peniche offers two dives at Berlenga Grande for 70 euros with kit-hire for 20 euro. Departure is at 9.30am and you return to harbour in the afternoon. PADI & SSI courses are taught and there are facilities for rinsing and storing kit, and changing rooms with showers, acuasuboeste.com

DIVE CLUB CIPREIA in Sesimbra does two dives for 64 euros with kit-hire for 20 euros, morning or afternoon. It does SSI courses and has rinsing and kit-storage and changing rooms with showers, diveclubcipreia.com

DIVERS CABO DE PALOS (*pictured*) charges 45 euros for a dive at Islas Hormigas marine reserve, with packages such as four dives for 158 euros. It does PADI courses, has facilities

for rinsing and storing gear, kit-hire and changing rooms with showers. It can arrange accommodation, diverscabodepalos.com

UNISUB L'ESTARTIT offers one dive from 36 euros, with discounts for multiple dives. Hire gear costs 16 euros for the first dive, then 12.5 euros. There is one dive in the morning, one in the afternoon. The centre offers PADI courses and can arrange accommodation and stay-and-dive package deals. Kit can be rinsed and stored on the boat, unisub.es

RICHARD CONDLYFFE takes it to the bridge and hangs out with the diverse inhabitants that live in its shadow

MUCK-DIVING USA

ALONG THE LENGTH of Florida's south-east coast, many bridges span the intracoastal waterway, connecting the mainland to a series of barrier islands.

For the majority, these bridges are merely the means to reach a destination; typically, a beach, hotel or residence looking out to the Atlantic Ocean.

For scuba-divers, however, one of these bridges is the destination. The Jerry Thomas Memorial Bridge, commonly known as the Blue Heron Bridge, connects the Riviera Beach mainland to Singer Island.

In the 1920s Paris Singer, of sewing-machine family fame, planned to build a resort called the Blue Heron Hotel on the island, and a bridge was built to help facilitate the venture.

The hotel was never built, but over time the island was developed for hotels and residences. The current reincarnation of "The Bridge", as local divers refer to it, was built in 1974.

Above: Blue Heron Bridge and Phil Foster Park, with Singer Island in the background.

Right, from top: Striated frogfish; ciliated false squilla; yellow sting ray; great barracuda.

Beneath the portions of the bridge closest to Singer Island, in only 2-7m of water, lives a treasure-trove of fabulous macro life, some common to Florida and some not.

What enables this shore-dive is the Phil Foster Park, which provides the car-parking and beach access that divers need.

I ARRIVE AT MY West Palm Beach hotel. My flight was on schedule and I'm happy because that gives me the time I need to get my gear unpacked and camera ready.

I can make it to the bridge in time for the late-afternoon high tide and a day-one dive I hadn't been counting on!

Two minutes after a quick stop at the Force-E Scuba Centre to pick up a rental tank, weights and mandatory dive-flag, I'm in the car park.

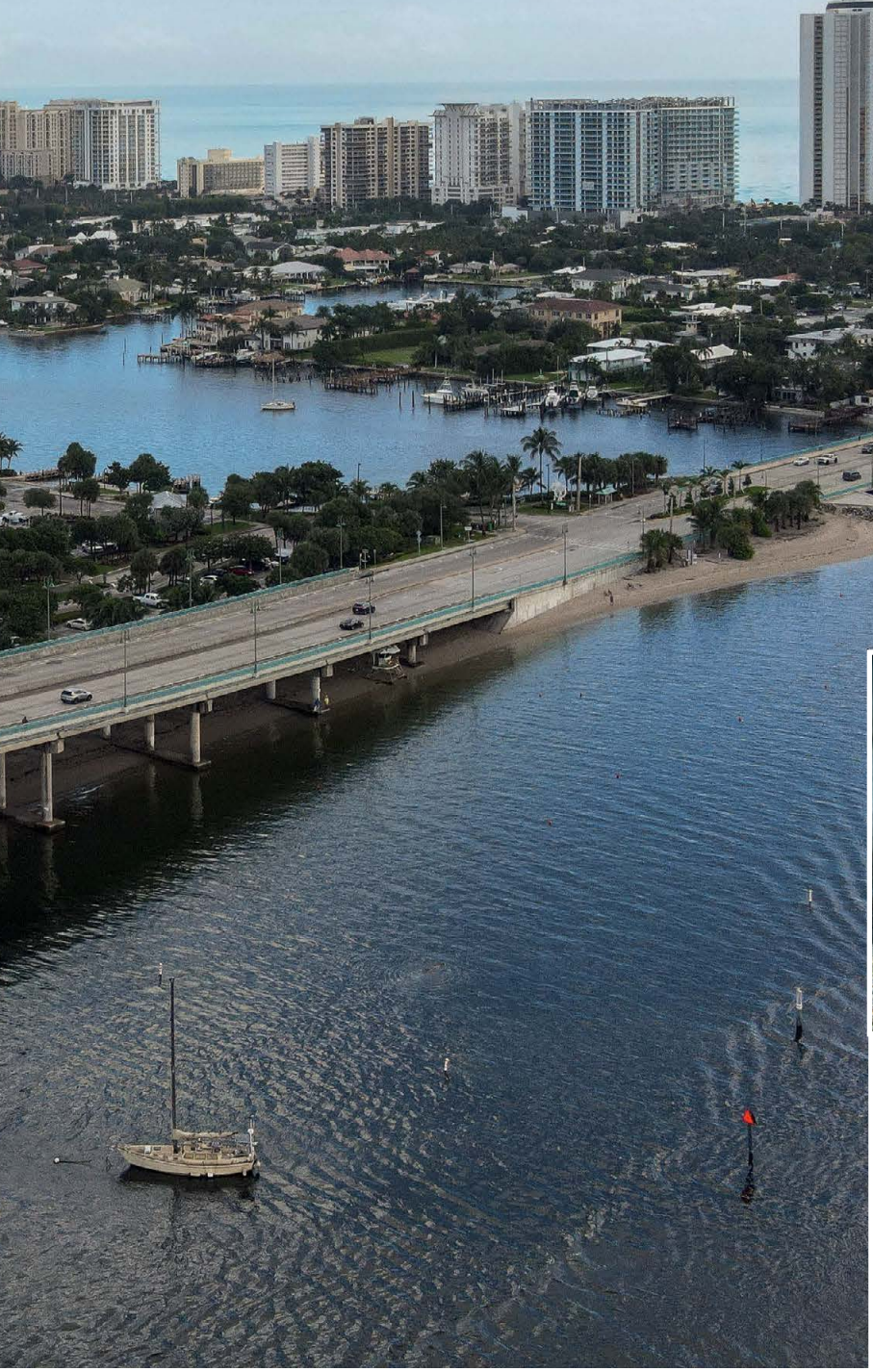
Getting a premium parking spot close to the beach means arriving an hour before entering the water.

At a leisurely pace I set up and wait for the clock to reach one hour prior to high tide. The Blue Heron Bridge dive is done at slack tide and I love the fact that, given its shallow depth, I can stretch a single dive to two hours – one hour either side of high tide.

The diving area is made up of three sections: the centrally located "snorkel trail", the "east span" and the "west span". A short walk across the sand and I enter the water facing the snorkel trail.

While my ultimate destination will be under one of the bridge spans, the snorkel trail is the smart entry-point, because one hour before high tide the ocean water is still rushing in, creating considerable current beneath the spans.

The milder current of the sandy flats, punctuated with areas of seagrasses as



I head towards the snorkel trail, make for a good start to the dive.

My attention is soon grabbed. In just 2m of water a striated frogfish shifts along the sand. Before I know it, 10 minutes have passed and I've started filling my camera's memory card.

I continue to make my way slowly across the sand, passing over numerous small holes and occasionally stopping beside one to see if it's occupied.

It's not long before a ciliated false squilla (from the mantis shrimp order) pops its head up.

By the time I reach the snorkel trail I have also encountered a couple of yellow sting rays and several great barracuda.

THE SNORKEL TRAIL in these shallow waters is made up of a series of large boulders and even three hammerhead shark sculptures.

Most of these well-positioned objects support extensive coral growth, which in turn attracts a broad variety of marine life. A series of warning-sign pilings mark the edge of the snorkel trail, and it's worth noting that these have their own share of life-supporting growth.

During my trip I explored these structures in detail, searching for an elusive seahorse, following a tip that this was a prime location for them.

I believe they're out there but the Blue Heron Bridge seahorses eluded me on this occasion.

Once at the snorkel trail a decision has to be made: go east along the trail, leading to the bridge's east span, or head the other way towards the west span. I take the former route.

Along the way I pass a bearded fireworm shuffling across the sand, reminding me to be careful where I put my hands. Talking of which, also commonly sighted at the bridge are

Above right: Spotted scorpionfish.

Left, from top: Juvenile cocoa damselfish; yellow garden eels; yellowhead jawfish; a goldspotted snake-eel glides over the rubble; green moray eel.

Right, from top: West span of the Blue Heron Bridge; Atlantic spadefish beneath the east span.

extremely well camouflaged scorpionfish, often resting in one of the several small boat wrecks that dot the area.

Along the snorkel trail, on a bearing of 90°, I encounter a variety of the local residents, including rainbow parrotfish, grey angelfish and cocoa damselfish.

As I leave the area I encounter a small field of yellow garden eels exhibiting their usual cautious behaviour around divers.

I'm 30 minutes into my dive. The current has calmed and I can stay comfortably in its direct path to the east span without having to fight to remain steady.

The rubble expanse just south of the bridge is my favourite part of the whole area. I dived this area three times during my visit, finding different species each time. Among the most bizarre was a polka-dot batfish, rare to Florida and unfazed by my presence.

Atlantic longarm octopuses also frequent this area and it's not unusual to see them during daylight, blending into their surroundings.

Drifting directly under the east span can feel slightly claustrophobic because the underside of the bridge is not much more than a metre above the water's surface. This darker area supports another set of creatures.

I find a goldspotted snake-eel gliding over the rubble exploring the rocky topography. On one of my dives I'm surprised by a 1.5m green moray.

If you find yourself with a wide-angle lens, a school of Atlantic spadefish often found under the east span makes for a pleasing composition among the bridge pilings.

BY NOW WELL INTO my second hour, the tide has turned. While the current has yet to pick up, the visibility has started to drop and the water appears milkier.

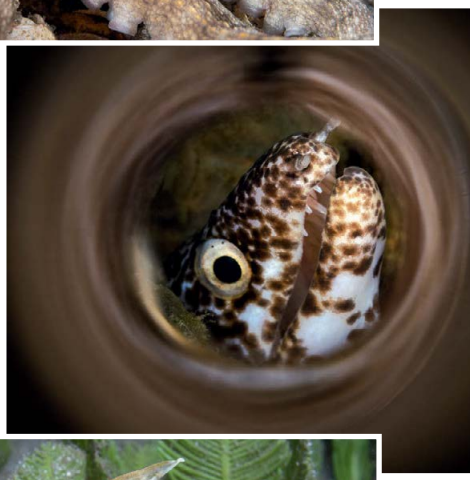
The clearer ocean water has reversed its course and is mixing with run-off from recent storms.

Six metres of visibility is considered good for the Blue Heron Bridge – which is fine for macro photography.

As I swim back towards my entry / exit point I keep my eyes fixed on the sandy bottom for more critter sightings, as well as for those elusive seahorses… another tip I had received was that they're sometimes found clinging to the seagrasses.

I complete my dive with a healthy inventory of photographs to download, and optimism that tomorrow I will find my elusive seahorse!

As the week progresses, I alternate between the east and west spans, each



Clockwise from top left: Giant hermit crab; seaweed blenny; Atlantic longarm octopus; spotted eel; fringed filefish hiding in seagrass; polka-dot batfish.

time starting in the gentle current of the snorkel-trail area, and timing my arrival at my chosen bridge span as the current diminishes.

The west span is less claustrophobic. The floor is a combination of sandy patches and rubble, occasionally punctuated by what look like abandoned wooden construction pilings. I spend most of my time exploring in and around these.

I discover one that's home to several seaweed blennies that were very comfortable with my presence, even allowing me to inch very close with a super-macro diopter to take a few headshots that I am excited to download.

Banded coral shrimp are plentiful, as are yellowline arrow crabs.

Navigating under and through the west span is easy thanks to the uniformly positioned concrete bridge supports, themselves well worth exploring.

With air getting low and the outbound current picking up, my last dive of the week nears its end. I swim back to my entry-point, remove my fins and walk back to my rental car.

After removing my gear and rinsing in one of the freshwater showers, I load the car and chat for a few minutes to another diver. "Good dive?", I ask him.

"Great", he replies, "I got some great shots of a black longsnout seahorse on the west side!" I laugh in disbelief!

I CAN SEE WHY diving the bridge never gets boring for the locals. You know you'll see a few of the resident critters, but there will always be a surprise or two, and they're not always macro.

On previous trips these surprises have included several eagle rays, a bull shark and a large southern sting ray.

I have always found the local divers friendly. They are rightly proud and protective of their dive-site. This was shown in 2018 when outrage ensued after local divers witnessed fish being collected to be sent to a Texas

Clockwise from left: Stareye hermit crab; striped burrfish; balloonfish; banded coral shrimp; plumed scorpionfish.

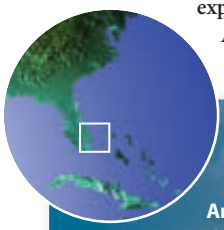
aquarium. They quickly had this stopped by the authorities, before turning to lobbying the Florida Fish & Wildlife Conservation Commission.

Within six months a regulation had been passed prohibiting the collection and possession of marine life from the Blue Heron Bridge area.

During my week in south-east Florida, not only did I manage six dives at the Blue Heron Bridge but I also enjoyed a blackwater drift dive and explored the local Atlantic reef system. Good planning, which included studying the local tide tables, allowed me to create a full and varied diving schedule for the week.

While few Europeans travel to Florida specifically to dive, with Orlando only a 2.5hr drive away and Miami 1.5hr, building diving into a Florida trip can easily be accomplished.

The West Palm Beach and Jupiter area have hotels for all budgets. Dive gear can be rented from the local dive-shops, including Force-E Scuba Centre in Riviera Beach and Pura Vida Divers on Singer Island. I will be returning soon to find my seahorse!



FACTFILE

GETTING THERE ▸▸ BA and American operate flights from London to Miami (about 75 miles from the bridge), or connect through many US cities to West Palm Beach (five miles away).

DIVING ▸▸ Force-E Scuba Centre, force-e.com, Pura Vida Divers, puravidadivers.com

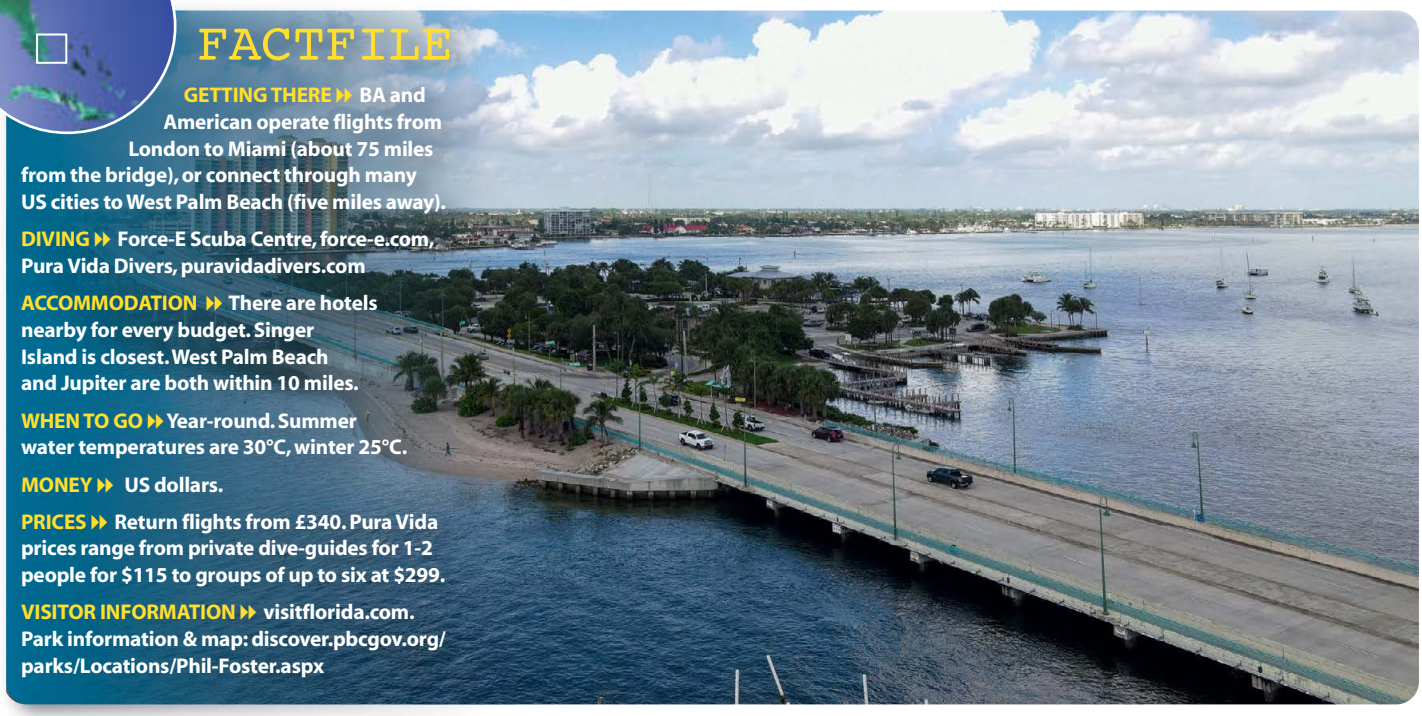
ACCOMMODATION ▸▸ There are hotels nearby for every budget. Singer Island is closest. West Palm Beach and Jupiter are both within 10 miles.

WHEN TO GO ▸▸ Year-round. Summer water temperatures are 30°C, winter 25°C.

MONEY ▸▸ US dollars.

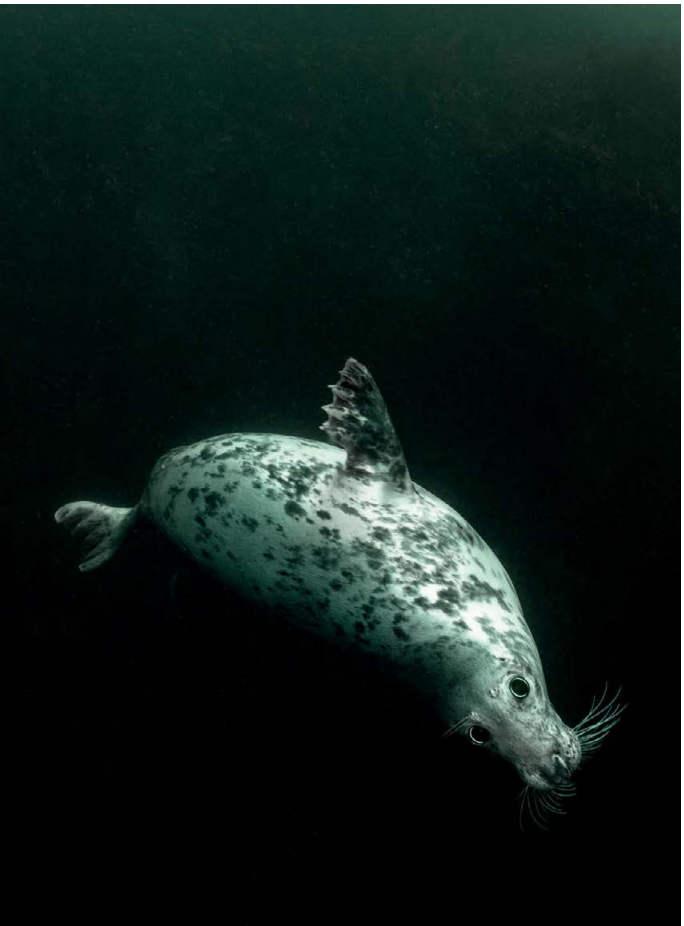
PRICES ▸▸ Return flights from £340. Pura Vida prices range from private dive-guides for 1-2 people for $115 to groups of up to six at $299.

VISITOR INFORMATION ▸▸ visitflorida.com. Park information & map: discover.pbcgov.org/parks/Locations/Phil-Foster.aspx



FARNES

FIRST IMPRESSIONS



It's British diving at its most iconic, off the coast of Northumberland – words & photos by first-timer HENLEY SPIERS

THE FARNE ISLANDS are one of those fabled British diving spots I had long meant to visit. When the invitation to join a trip there came from old friends (and accomplished underwater shooters) Dave Baker and Paul Pettit, it was too good to miss.

All the more so because my diving had been limited not only by Covid-19 but also the recent birth of our second baby daughter. Dave and Paul make an annual pilgrimage to the Farnes, and knowing that my UK diving experience was limited, they were eager to show me just how good it gets.

Grey seals were the headline act, and I was familiar with the viral videos of exceptionally friendly seals interacting with divers in this location.

Excitement built on the long drive from Exeter up north, accompanied by a steady soundtrack of underwater photography podcasts and shows – one of few blessings of the Covid-19 era has been the outpouring of great online content.

We arrived at our base in Seahouses to glorious blue skies and sunny weather, but with the wind due to pick up next day there was the usual trepidation as to whether the diving would go ahead.

A dive-trip is always a source of excitement, but in these troubled times the prospect of an underwater escape was even more keenly anticipated.

Our small group, composed of old friends and new, instantly bonded in the special way that divers tend to have – by a passion that unites even the most disparate of characters through shared appreciation for being under the sea.

We regaled each other with scuba stories from times past, tales of incredible aquatic encounters, and memorable diver cock-ups!

Although the next day saw the skies turn grey, it wasn't enough to

discourage our skipper. So we filled our bellies with a hearty English breakfast and headed for the harbour.

The thing with UK diving, especially for those (like me) who have done the bulk of their diving in tropical climes, is that there is no mollycoddling.

We were expected to show up with our own cylinders and weights, and then lug everything to the boat.

I imagine it's the combination of this hardy dive prep, as well as the challenging conditions, that sometimes causes hardcore British divers to look down their noses a bit at divers more accustomed to being eased into a BC before jumping into warm, tropical waters with nothing more than a rashvest as protection.

From the harbour we reached the Farne Islands in 20 minutes, and the soulful call of grey seals reached our ears.

It is a far more gentle cry than that of their cousin, the California sea-lion – like a cross between a melancholic dog and an owl, it's a soothing, vulnerable sound that echoes around the bays of these islands.

The Farnes are now owned by the National Trust, and there is a long history of conservation there.

Back in the 7th century, monks were the first human inhabitants of these isolated islands, and St Cuthbert's special law protecting seabirds, made in 676, is thought to be the first conservation law of its kind for birds anywhere in the world.

Although grey seals are protected and carefully monitored by the trust today, they didn't always enjoy such a privileged existence and have long been hunted by humans, with the monks prizing them for both their flesh and oil.

WE JUMPED IN and swam towards the seal colony. Because the seals are our primary dive objective, this would not be a traditional scuba-dive. Most of our time would be spent very shallow, hoping for visits from playful pups.

I was almost immediately buzzed by a grey seal that appeared suddenly out of the murky water, waving at me with its flippers before disappearing again.

The wind pushed the water against the shoreline, creating a rather nauseating sensation as we were swept to and fro over kelp-beds, waiting for the seals.

Above left: Paul & Alison Pettit and Dave Baker.

Above: An inquisitive grey seal.

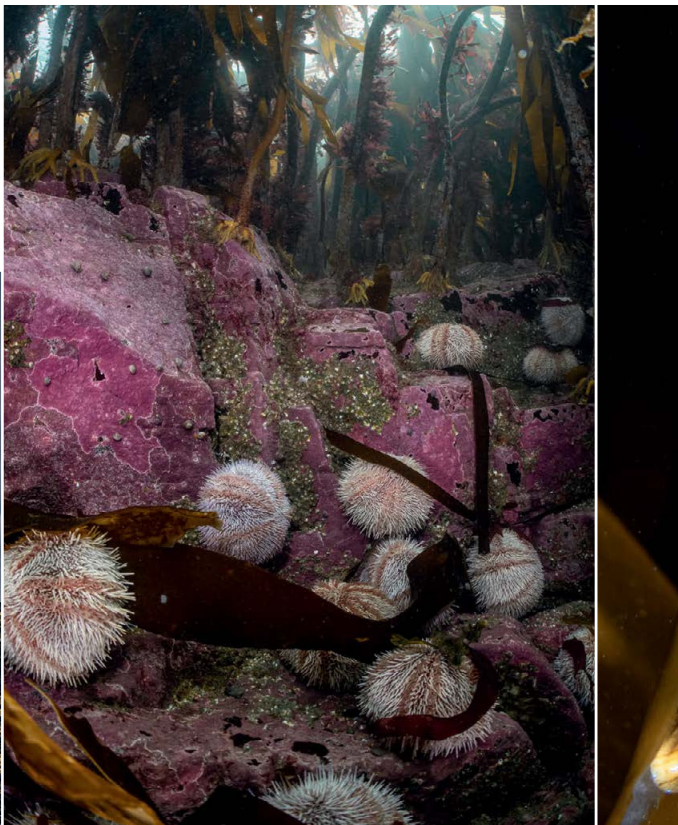
Below, from left: Seals hanging out by the lighthouse; edible urchins eating kelp.

The excesses of the previous, celebratory evening certainly weren't helping, but even those who had abstained were suffering from sea-sickness in a quite literal sense.

The seals were not proving especially interactive on this dive, so we had more time to dwell on our physiological state.

One escape lay just a few metres deeper, into the valleys running out to sea.

There I could see the base of the kelp fronds, reaching above –an underwater forest with roots so densely packed on the



Above: A two-spot goby.

Below: A diver waits for seals in the kelp.

sea shelf that we stood no chance of swimming in. The small valleys carved out by water movement allowed me to peek into this environment.

Edible sea urchins dotted the sea bottom, coming in a pleasing palette of whites and pinks. Kelp will grow and perish seasonally, and as fronds break off and fall to the seabed, the urchins will greedily gobble them up.

This kelp forest acts as both a place of safe refuge from large predators and a good location to ambush your prey.

The bright red eyes of a mating pair of velvet swimming crabs peered out from the roots. They were piled one on top of another, with their hind legs clasped around the kelp. It might be poor form, but I couldn't help but take a closer look. They looked back at me with fiery eyes.

My post-dive research on the length of this species' love-making would prove inconclusive, but my sense was that this was a lengthy coital ceremony.

Further along, a spider crab artfully clung to a sheet of kelp, proudly showing off its seaweed quiff.

The one area in which UK diving has the tropics outmatched for luxury is the diver's lift.

Ending our first dive, we swam to the back of the boat and were impressively lifted out of the water as we stood on a metal platform – now that is cool!

The atmosphere was a little muted during the surface interval, a function of lingering seasickness, and seal action that fell below the heights hoped for. We had timed our visit in late summer to coincide with the moment when the pups were old enough to feel confident enough to venture away from their parents, but so far the seals were proving rather skittish.

Below, from left: Blue-rayed limpets; mating velvet swimming crabs; diver on the wall.

THE SECOND DIVE, at a site named Hopper, would also prove to be frustrating from a seal perspective, but I was having so much fun in the kelp that I didn't mind much.

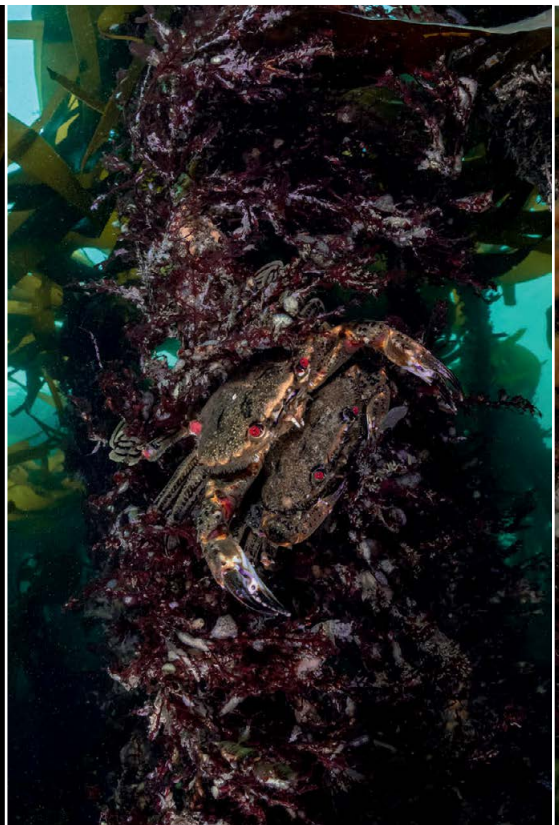
The kelp fronds themselves are beautiful, and their bronze allure is a perfect match for the blue-green water. As the protective sheen on the fronds is worn away, small animals come to nibble at it.

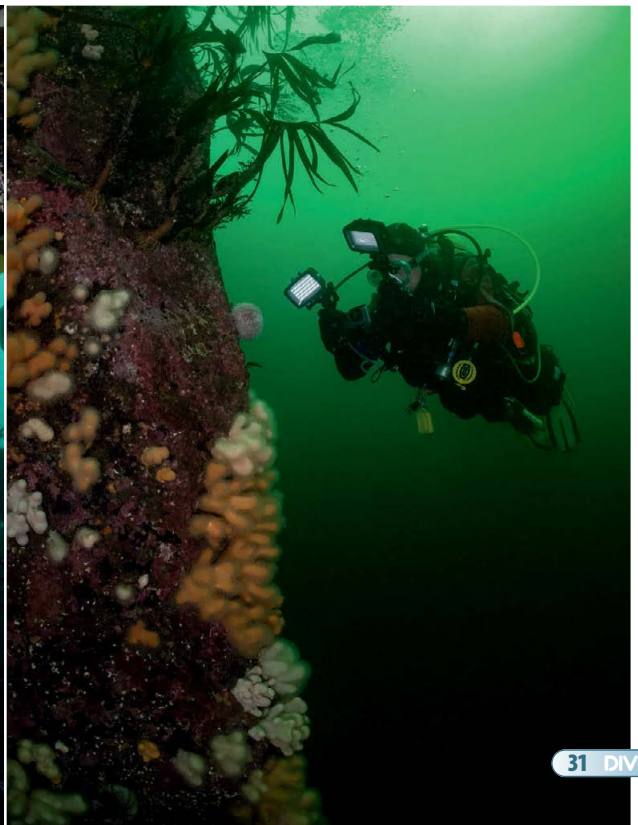
In the Farnes I was finding fronds festooned with blue-rayed limpets, clustered into small colonies, and with some individuals as large as a thumbnail (which is a decent size for a blue-rayed limpet).

This might all seem like an excessive amount of excitement for a limpet, but iridescent blue lines running along the shell of these molluscs makes them visually unforgettable.

They carve out a small pit in the kelp where they hold fast. Look closely and you'll also see pockmarked spots on the kelp that they have already vacated.

Elsewhere in the shallow kelp beds,





I came across small communities of two-spot gobies. Distinguished by (you guessed it) two dark spots front and rear, the males of this small species of fish proved far more confident in my presence than the seals, hovering in place as I approached within inches of them.

WE RETREATED TO Seahouses for the night before returning the next day. Spirits were high as the sun broke through the clouds and calm seas awaited us. The howls of the seals greeted us once again, and they hauled themselves awkwardly off the rocks as the tide rose.

Once in the water, they were once more in their element, transformed into agile swimmers with a Lewis Hamilton-esque burst of acceleration.

We too threw ourselves into the water, though sadly we couldn't match the seals for aquatic grace.

Dave and Paul enjoyed some tremendous seal activity on this dive. Old hands at this location, they found a shallow bay near the seal colony, and basically lay on their backs on the rock.

This vulnerable position, and the outstretched fins of the divers, seemed to be catnip for the seal pups, which now felt confident enough to visit repeatedly, and close up, often nibbling at the fins.

My attention had been caught by something else, however, as I dropped 20m along a spectacular wall.

Above: Split shot of a grey seal.

Below, clockwise from top: Surfacing to the sight of birds wheeling over the lighthouse; seal in the sunbeams; boat entering the harbour.

There, the kelp gave way to dead men's fingers cascading down a sheer rockface. Their orange and white bodies reached out into the water column, polyps raking in nutrition from the water column.

They effectively hibernate through autumn and winter, no longer extending their polyps at all until spring comes.

AS I CRANED my neck to look back up towards the kelp fronds waving in the distance, I felt as if I was beginning to understand this ecosystem in which the kelp plays a vital role, and where an entire, seasonal food chain is built vertically. The water was a crisp 12°C but for me this underwater scenery was as resplendent as a coral reef.

As I gazed closer, the presence of smaller creatures also became apparent: a colourful squat lobster here, a characterful Yarrell's blenny there, complete with tufted tentacles.

I was starting to miss my macro lens – this was a site that could be approached from so many perspectives.

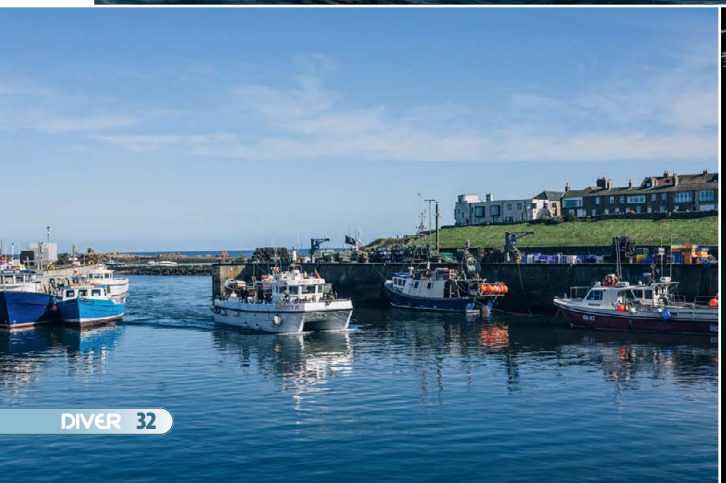
"The Farnes are not just about the seals." Just as that thought occurred to me, I was startled out of my reflection by a nibble on my fin. Spinning around, I was greeted by a bewhiskered face and cheeky eyes. Two pups had dived down to join me, clearly wondering why I wasn't trying to play with them.

I barely had time to bring my camera up for a picture before they darted away again, quick as a shot. I followed their tracks through the gully, gently ascending close to the surface, where most of the other divers had positioned themselves for optimal seal encounters.

This relocation was rewarded by a seal coming to meet me at the surface, contorting its body in an impressive feat of flexibility. As I peeked my mask over the meniscus, I spotted big smiles from Dave and Paul, both high on diving and sea(l) life.

Hundreds of birds passed overhead, framed by perfect blue skies, and, for a moment, all was right with the world.

The seal encounters were not quite as I had hoped, but the Farne Islands impressed me in so many other ways. I intend to join the annual congregation of divers at this great British diving spot.



Henley stayed in Seahouses at the Olde School House B&B, theoldeschoolhouse.co.uk, and dived with Serenity Boat Tours farneislandstours.co.uk/diving-with-seals

Immersed

LOUISE TREWAVAS

IT WAS SUCH A FUN DIVE! Well, until we all got horribly lost and nobody could find the boat.

The dive-guide is holding a white board as divers gather on the upper deck. It shows a felt-pen map of the dive-site. A few strategically placed sea-creatures help to liven up the crudely drawn blocks of coral and wobbly gorgonians.

The plan is simple. The boat drops us at the red pen mark. We follow the reef, in the direction shown by green arrows.

More green arrows show where we leave the reef to explore two *ergs* – big coral lumps. The arrows perform an elegant figure of eight around the *ergs*, then return to the reef wall, and continue to a shallow bay. The drawn shape of a boat is shown in a mooring position.

A few warnings: Watch your air. Don't go below 50 bar. The crew will hang a cylinder of air beneath the boat in case you need it on your safety-stop.

Don't mess with lionfish. Don't put your hand on a stonefish. Here's the signal for shark. OK, let's go! Enjoy.

If you've done day-boat diving in the Red Sea, this is likely to sound familiar. It's relaxed, after all, you're on holiday and what could go wrong?

People are strapping on their kit and waiting to jump when told. Some fret about a twisted fin-strap. Some quietly worry about flooding a mask or dropping a camera. Others wonder about blasting through their air too fast. Most are just thrilled to be going diving.

Diving is amazing. It engages every part of you. You lose yourself in another world. A dive achieves exactly what those "augmented reality" designers strive for – an immersive experience.

You can be so "in the moment" that you forget to consider how the dive might end up.

SO… EVERYONE JUMPS IN and descends, and it all unravels. One diver with a serious ear problem is escorted to the surface and helped back onto the boat by the dive-guide. The boat then leaves for the mooring site, dive-guide on board.

Under water, confusion reigns. At least half the group had paid no attention to the briefing, expecting the dive-guide to navigate the site for them. Buddy-pairs scatter in the light current. Some get lost among the *ergs*, surfacing when disorientation gets too much or air becomes low. One pair disappears in totally the wrong direction.

A few of us have managed to navigate the site at leisure and reach the mooring point. The boat is nowhere to be found. Unknown to us, it's off retrieving the scattered divers who are bobbing at the surface, drifting further away by the minute.

We look at each other and shrug. Doubts occur. Is this right? Should we swim further? Whatever difficulties we imagined as we jumped from the boat earlier, this scenario wasn't among them. This is nuts.

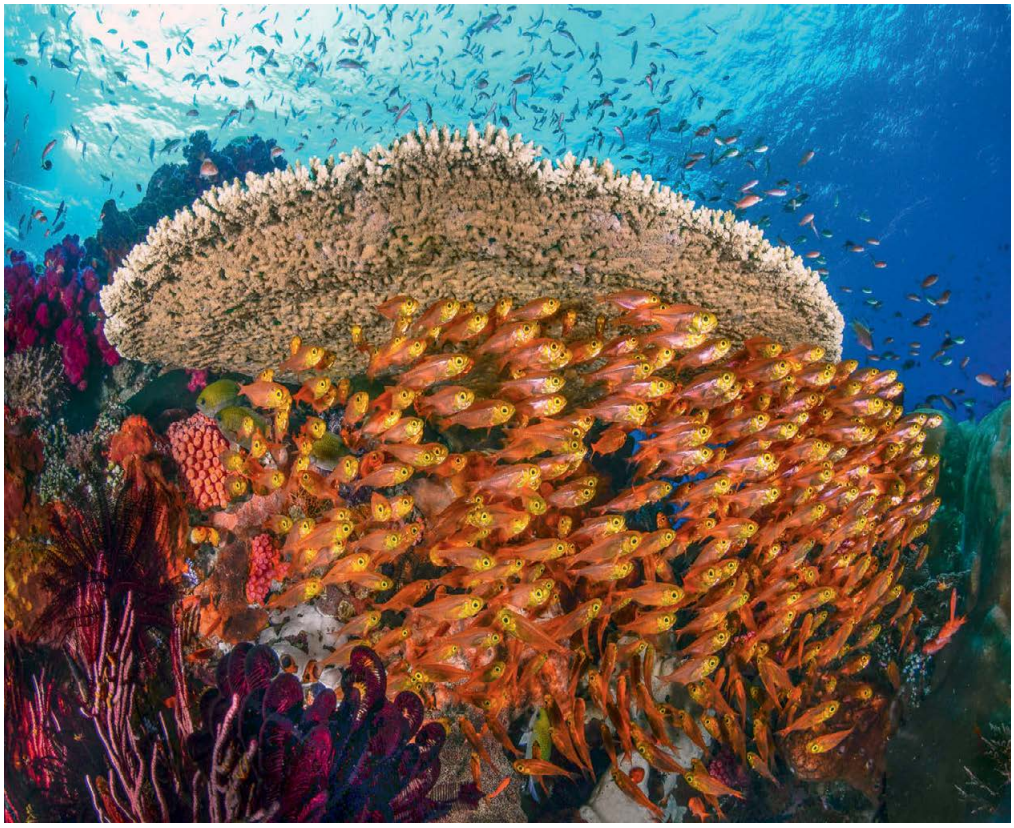
The boat finally appears at the mooring. Low on air and getting a bit chilled by now, we head gratefully for the ladder.

As I clamber aboard I realise that everyone is speaking Spanish. This… isn't our boat.

This isn't the dive plan, it's the diving equivalent of *Fawlty Towers*. I sit down to de-kit, and hope that nobody mentions Gibraltar.

AT THE HEART OF THE CORAL TRIANGLE

That's the title of a major new book by photo-journalist ALAN POWDERHAM and coral-reef specialist SANCIA VAN DER MEIJ – here are six extracts to provide a flavour…



The sounds of silence

"THE SILENT WORLD" was famously coined at the advent of scuba-diving in the 1940s by Jacques Cousteau to convey the novel and incredible experience that it offered. In reality, with standard diving equipment, any sense of true silence is only momentary between breaths.

And even so, the underwater world is hardly devoid of sound. Fish make many vocalisations: parrotfish are continuously scraping away at the coral and even a turning school of fish emits a soft swishing sound like a flock of birds.

Apart from volcanoes, the loudest natural sound I have heard under water is that from the tail of a large grouper when it strikes and is literally like the crack of a whip.

However, these natural sources are far exceeded by those of breathing from a diver. To be really immersed in the quasi-silence of the reef, one needs a rebreather.

This equipment brings many benefits. Having a closed breathing circuit eliminates the noisy and disruptive exhalations of bubbles that are inevitable with normal scuba.

They enable intimate and extended observations of marine life and bring a heightened awareness of becoming one with the underwater environment.

No other experience quite compares to floating in neutral buoyancy, immersed in the living tableaux of rich reefscapes. In a glittering kaleidoscope of movement, schools of golden sweepers like those shown here can become almost mesmeric. Although these scenes were impressively crowded with fish, they conveyed a seductive sense of peace and serenity.

The sweepers featured here are just a few centimetres long and belong to a family of fish that is generally confined to the Indo-Pacific region. There are around 25 species and some, being quite transparent, are also known as glassfish.

They are generally most active at night and have the large eyes typical in nocturnal feeders. During the day they can be observed in closely packed aggregations as they shelter in caves or beneath shady overhangs.

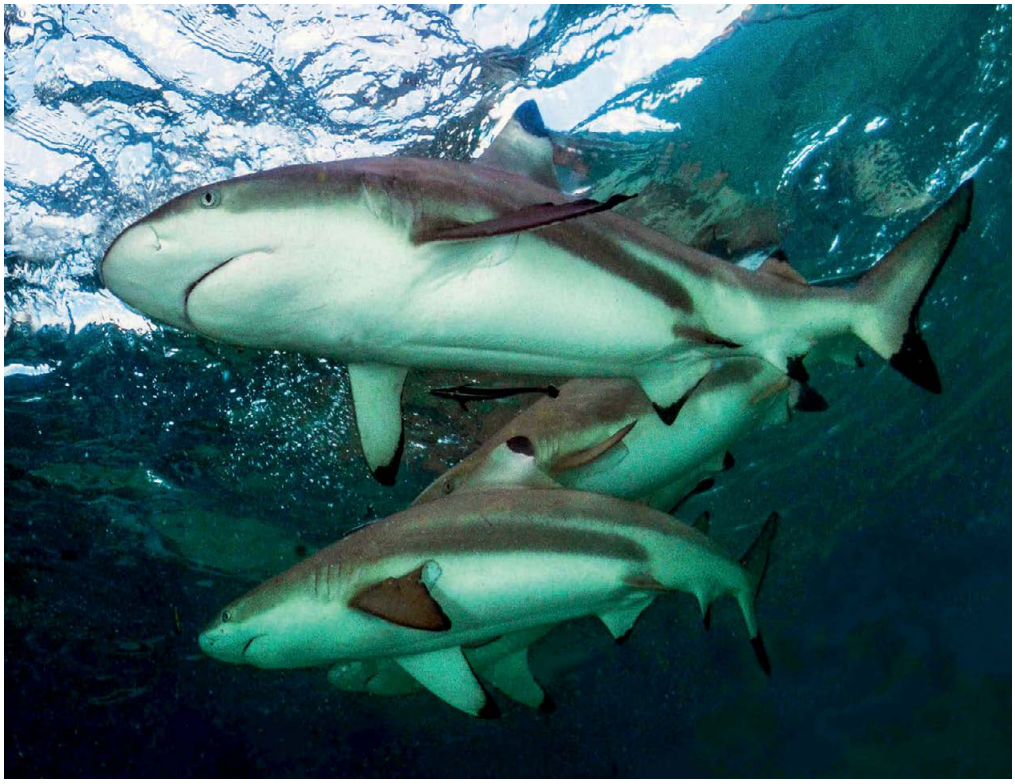
They may share such sanctuaries with other fish, even much larger species.

This contrasts with the diurnal zooplankton feeders seen above, high up in the water column above the fan of Acropora coral beneath which the dense school of sweepers crowd for protection.

During periods of low visibility and abundance of zooplankton, the sweepers may be tempted out to feed during the day as shown, as they rise from their refuge in an upward spiral into open water.

Location: Misool and Triton Bay, West Papua

Intelligent life



HISTORICALLY, FISH have often been regarded as evolutionarily primitive, with low intelligence and 3-second memories. Yet countless observations of marine life have consistently shown that fish are notably intelligent and naturally curious.

They have successfully evolved over 400 million years and, with more than 34,000 species, have achieved a diversity exceeding that of all other vertebrates combined.

The photos here show blacktip reef sharks, barracuda, and dart trevallies approaching in close proximity to investigate my presence.

It has been a constant source of delight and fascination to encounter such overt interest, an experience greatly enhanced if I remained patiently still in one location. Quite soon I would become more the observed than the observer.

The inherent curiosity of fish is even more evident when diving with a rebreather. While my fellow-divers using standard scuba gear merely received fleeting visitations, at best, they have reported that I often disappear completely enveloped within concentrated shoals of fish.

Without the deterrent of noisy exhalations, this behaviour became so predictable that I could select an attractive reef panorama and wait for the arrival of the fish to complete the picture.

As noted later in this chapter, the majestic manta rays are widely noted for their interest in divers but similar curiosity is shown by the smallest to the largest of fish.

An amusing example occurred while quietly trying to photograph blennies. A pair of these shy fish is shown in "The Small Majority and Darwin's Paradox" in Chapter 9. The red coral grouper, shown in "The Deep Diversity of the Shallow Reef" in Chapter 1, tend to be even more evasive and difficult to approach for a good portrait.

On the occasion with the blennies, I had the sudden sense of also being closely watched.

Turning to look back, I was greeted by the sight of no fewer than five of these groupers hovering so closely behind me that they could peer over my shoulder – apparently quite absorbed with my activities.

To my amazement they did not immediately disperse upon my discovery, presumably having concluded that I was not a threat. Fish are indeed surprising and curious.

Location: North Raja Ampat, West Papua

Above: Blacktip reef shark (*Carcharhinus melanopterus*).

Above left: Blackfin barracuda (*Sphyraena genie*).

Left: Snub-nose dart (*Trachinotus blochii*).

Opposite page, top: Golden sweepers (*Parapriacanthus ransonneti*) and hard coral (*Acropora sp*).

Opposite page, left: Golden sweepers and black coral (*Antipatharia sp*).

Bubble netted jacks

THESE PHOTOS SHOW an unusual interaction between two species of jackfish and divers. In a dramatic scenario of the hunters being hunted, a vast school of big-eye trevally is under attack from a small pack of the much larger giant trevally. Fish naturally align themselves to swim into the prevailing current.

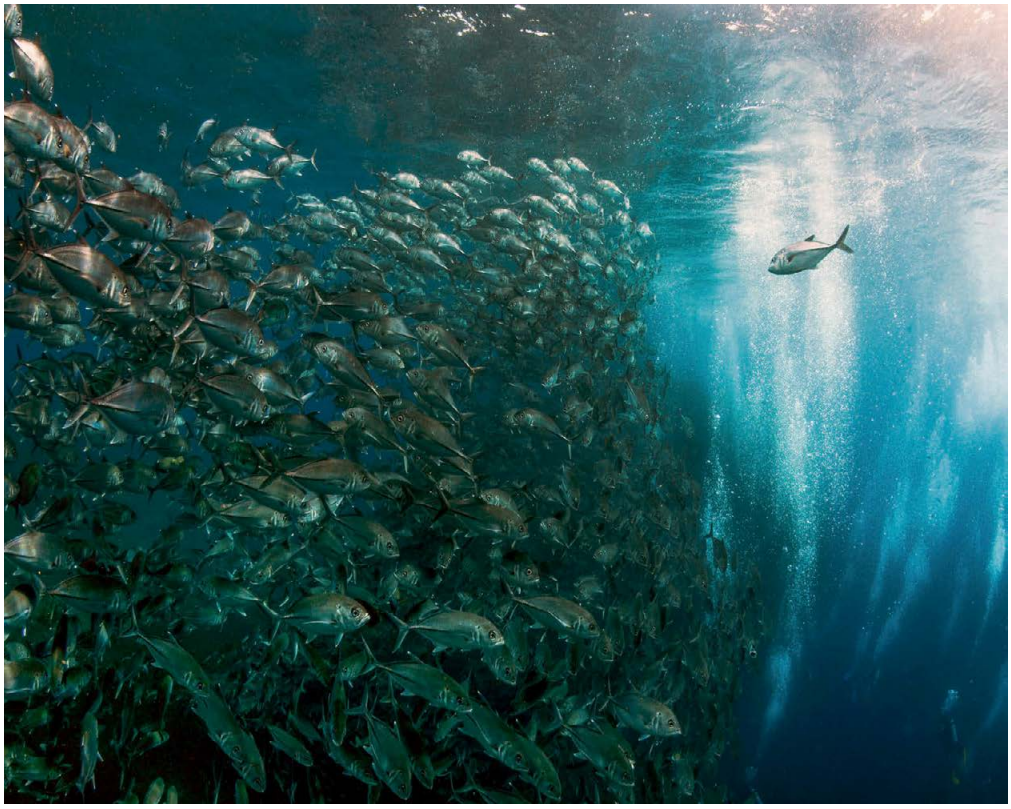
However, at slack tide certain species of schooling fish, such as barracuda and jacks, typically respond to the lack of current by literally going round in circles. More on this is described in "The shape of water".

Here, during these periods of deceptive calm, the giant trevally would join this merry-go-round of spiraling big-eyes and endeavour to manoeuvre them into progressively tighter groupings, thus presenting easier targets for their attacks.

The location is a very popular site for divers as it features a large and relatively shallow shipwreck.

In a fascinating example of learned behaviour, the giant trevally were observed to exploit the divers' presence by driving the smaller trevally towards the curtain of bubbles the divers created.

It was a hunting strategy reminiscent of the bubble-netting methods of humpback whales when feeding on herring. Like the herring, the big-eye trevally would not pass through the "wall" of bubbles and so evade their attackers.



Above, right & bottom: Bigeye trevally (*Caranx sexfasciatus*) and giant trevally (*Caranx ignobilis*).

Below: Giant trevally.

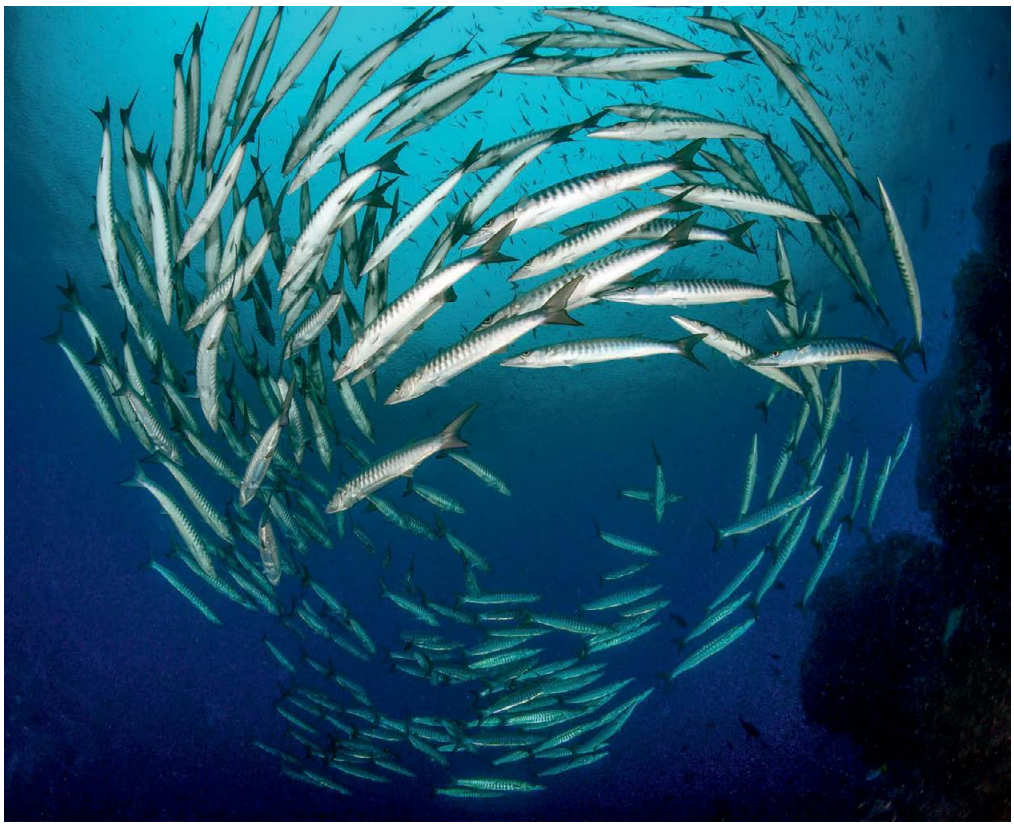
While such strategies might seem surprising, giant trevally are noted for their opportunistic hunting techniques.

For example, they are known to shadow monk seals and sharks enabling them to ambush unsuspecting prey. Their eyes feature another hunting enhancement in having a band of concentrated photoreceptors enabling a panoramic view for predatory opportunities.

More conventional examples of predation by giant trevally feeding on anchovies are provided overleaf. There the anchovies are shown forming a tunnel around the trevallies as a defensive reaction to the attacks.

Location: Liberty wreck, Tulamben, Bali

The shape of water

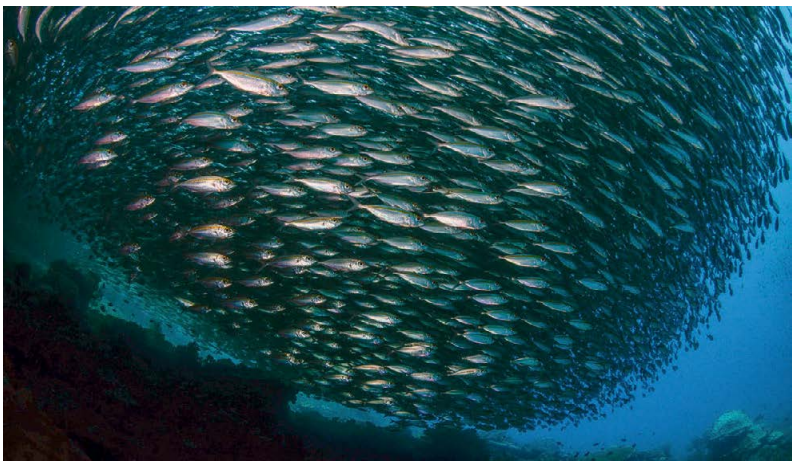


WHILE THE STRENGTH of currents may be visually evident at the surface, when under water one may need other indicators. In this respect, the shapes adopted by schooling fish can provide useful insights. The circular formation of the barracuda, as shown on the right, is commonly likened to a tornado. These violent creations of thunderstorms, spin with destructive energy and velocity.

Ironically, this pattern of schooling fish arises from quite the opposite conditions. Fish will orientate head-on into the prevailing current.

Consequently, it is the very absence of current between tides, providing no preferential direction, that lead fish to adopt these circular formations.

It is therefore a popular misnomer to associate these silent circles with the violent weather of high-speed whirlwinds. So, while notably dramatic in aspect, the barracuda are effectively resting in neutral. The only common factor with a tornado, apart from the similar geometry, is perhaps the stillness at the centre.



Above & bottom left: Blackfin barracuda (*Sphyraena genie*).

Left: Oxeye scad (*Selar boops*).

Location: Misool, Raja Ampat South

The fish are certainly not in feeding mode and it is possible to safely swim into the middle to be enveloped within a curiously gentle merry-go-round of these renowned and voracious predators.

These types of circular formations are typically encountered in schooling predatory fish – such as barracuda and jacks. The latter may be seen swimming in this orientation in "Bubble Netted Jacks" though, in this case, it is also partly a defensive reaction to the predatory intentions of the larger trevallies.

The even more tornado-like appearance of the school of scad (*above left*) is wholly generated by defensive tactics as in the "bait-ball" formations of sardines and other small prey fish under attack.

Returning to the barracuda, as soon as the tide starts to turn and the current builds, the fish will promptly begin to unwind and spiral away to orientate to the current (*left*).

It is important for divers to be aware of changing conditions, especially in the many areas of restricted underwater topography where strong currents can rapidly generate.

It is easy to become immersed in the experience of close encounters with such majestic fish. But they can also convey important information. Their changing formations will signal the transience of the moment and the need for divers to respond to changing conditions.

Turning turtle

THE TWO SPECIES of marine turtle most commonly encountered in the Coral Triangle are the hawksbill and the green. They are both global in their range across tropical and sub-tropical regions.

The females of both species, having an incredible navigational ability, return to lay their eggs in the same breeding grounds from which they originated. This creates both threats and opportunities for the survival of these wonderful but endangered animals.

The array of threats faced by both species include the loss of feeding and nesting habitats, commercial harvesting of the eggs, and as bycatch in fishing nets and lines. As highlighted by conservation organisations such as the WWF and Conservation International, one of the greatest threats still comes from the illegal trade in wildlife.

Despite the implication in the name, the primary source of the tortoiseshell widely used for decoration is not obtained from the eponymous land-based reptiles but from sea turtle shells. This applies particularly to hawksbills – even though the international trade in their shells was prohibited nearly 30 years ago.

The combined impact from these multiple threats has been harder on the hawksbills, listed as critically endangered by the IUCN. They are now protected by a range of international conventions such as that on Migratory Species (CMS) or for the International Trade in endangered species of Wildlife Fauna and Flora (CITES). Such international co-operation is essential for turtles, given their extensive geographic range.

Marine turtles are the descendants of a group of reptiles that has inhabited the oceans for over 100 million years. As a key migratory species they provide an important link in marine ecosystems and help to sustain the health and diversity of coral reefs.

Hawksbills generally reach 1m as adults and weigh up 80kg. Unlike the green turtle, they remain omnivores throughout their life and are named after their distinctive pointed beak. They are particularly partial to sponges and will assume possession of an outcrop by sitting right over it and dining at their leisure as shown left.

They also feed on anemones and jellyfish and, on more than one occasion, I have needed to fend off a determined hawksbill that had mistaken the dome-port of my camera housing for a potential meal. While presenting dramatic photographic opportunities, the likely abrasion inflicted by their sharp beaks would not have improved the optics of my camera system.

Hawksbills also consume algae, sea urchins, crustaceans, and molluscs and will often be seen in a duck-like orientation with their tails up and heads buried in the coral seeking such tasty fare as shown above.

The scene shown at the top of the page occurred towards the end of a dive. The turtle glanced at my companions high up on the reef and turned back to peer at me, perhaps wondering how I managed to remain with such a silent presence and making no bubbles.

More of the joys of using a rebreather.

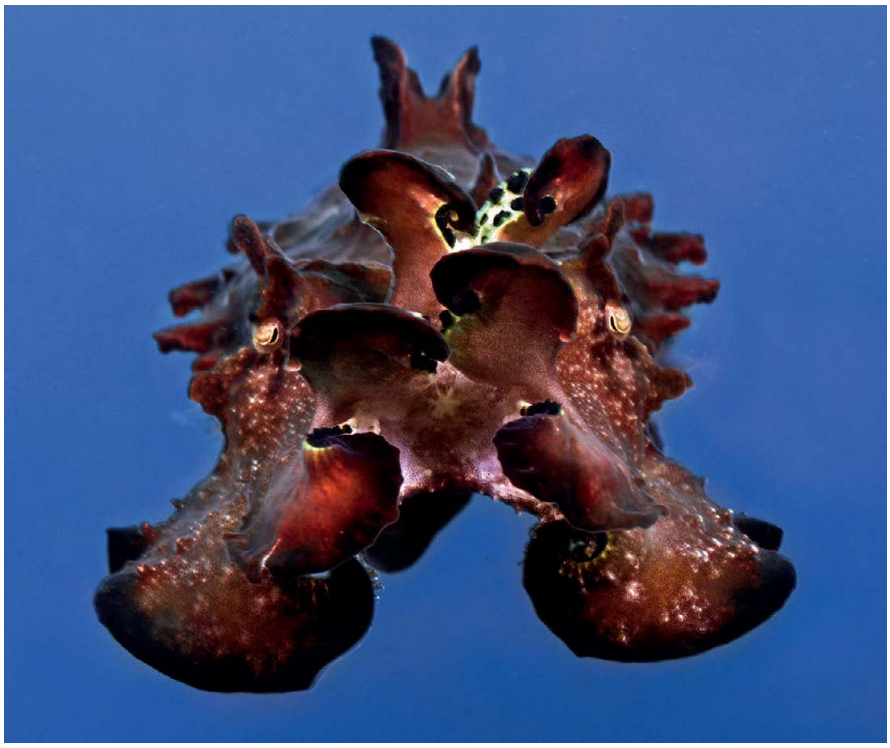
Location: Komodo National Marine Park, Lesser Sunda islands

Above: Hawksbill turtle (*Eretmochelys imbricata*) of up to 1m sitting on reef among sponges (*Petrosia sp* and *Gelloides fibulata*) with feather hydroids to the right.

Right: Hawksbill feeding among *Acropora* coral.

Below: Hawksbill consuming demosponge (*Petrosiidae sp*).

Opposite page, clockwise from top left: Flamboyant cuttlefish of up to 8cm (*Metasepia pfefferi*) rising high in the water column; showing bright colouration when excited; extending a feeding tentacle.



Mercury rising

THE MERCURIAL and aptly named flamboyant cuttlefish even manages to stand out from other cephalopods – a field well crowded with exhibitionists. This small cuttlefish, measuring less than 8cm, is a master of camouflage and can completely merge into the sandy substrate – so well, in fact, that it is virtually impossible to discern its outline.

However, as described below, it also has quite an extrovert side. Most cephalopods tend to be nocturnal hunters. It may therefore seem surprising that this diminutive creature may be seen confidently parading across the sand during the day.

The word parading is used advisedly, since it can display the most colourful of uniforms as it literally marches across the substrate. In a form of locomotion unique to this genera, it uses two of its lower arms and the rear parts of its mantle to amble along if with a rather eccentric gait.

However, this wonderful little creature is far from pedestrian in nature. Its confidence, so evident during its daytime forays, derives from its toxins – which have a potency not matched in other cuttlefish.

It advertises this deadly threat by displaying some of the most dramatically aposematic patterns in the animal world.

As shown top right, it produces a living palette of vibrant colours varying from violet and crimson through to orange and yellow. If approached when in its drab livery of camouflage fatigues, it will suddenly discard them to reveal its spectacular colour show. One may watch entranced as wave after wave of changing colours wash across its body, during which it will extend its arms in a variety of eccentric postures.

Its default mode when not under threat is not always one of total camouflage, as I have seen them from afar dressed in their most colourful attire.

They are also impressive opportunists. On occasion, despite my close presence to photograph them in full aposematic plumage, they have calmly continued to feed. They will suddenly shoot out their feeding tentacles to grab some attractive morsel, such as a shrimp, that inadvertently wandered within range. The lower photo above shows these feeding arms in action though, in this case, with the cuttlefish in more subdued attire.

Very unusual behaviour is shown top left, even for a flamboyant cuttlefish. They are not good swimmers so I was surprised to see this one lift away from the substrate.

Then, to my growing amazement, it continued upwards towards the surface.

Fascinated, I followed its slow rise in the water column. At around a depth of 5m it stopped and hovered and we hung together for a while observing each other suspended in the blue.

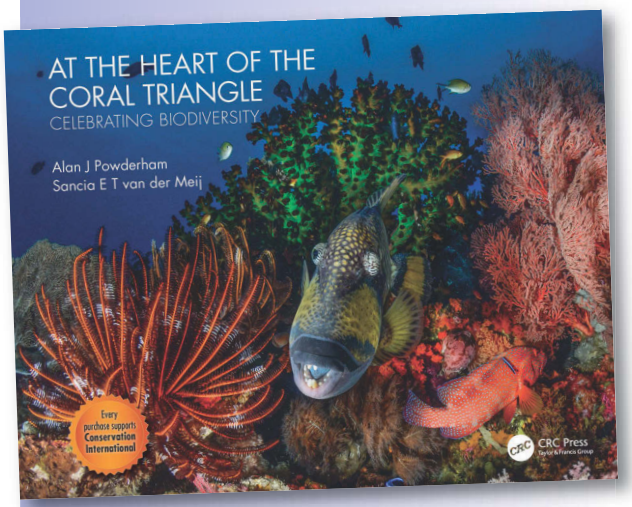
Conscious of my now rather eccentric dive profile, I made the first move and descended back to the reef, leaving the cuttlefish in its high-rise location.

Back on the sand, after checking my equipment, I was surprised and delighted to find the cuttlefish just behind me.

It had followed me back down, where it calmly resumed its idiosyncratic progress over the sand.

Location: Lembeh Strait, Sulawesi

NOW READ THE BOOK...



At the Heart of the Coral Triangle – Celebrating Biodiversity is a new book by UK underwater photographer and consulting engineer Alan J Powderham, whose use of rebreathers allows him to get unusually close to his subject matter, and coral-reef specialist Sancia van der Meij, assistant professor at the University of Groningen & Naturalis Biodiversity Center in the Netherlands.

The Coral Triangle, lying at the confluence of the Indian and Pacific Oceans, harbours the greatest biodiversity of marine life on the planet. While hardly immune to the growing global impacts of climate change and pollution, it is home to a wondrous variety of species living within diverse habitats. This book is intended to celebrates this biodiversity with the underlying message that it needs our protection before it is too late.

Each chapter – Seascapes, Fish Portraits, Invertebrates, Predation, Reproduction, Behaviour, Symbiosis, Reptiles and Conservation – includes multiple spreads of photos and text, as exemplified by the six extracts reproduced on these pages. 10% of the author royalties go to Conservation International to aid its work.

Hardback, 264pp, 205 illustrations, ISBN: 9780367428167, £40.99.
Also available as an eBook, ISBN 9780367855314.
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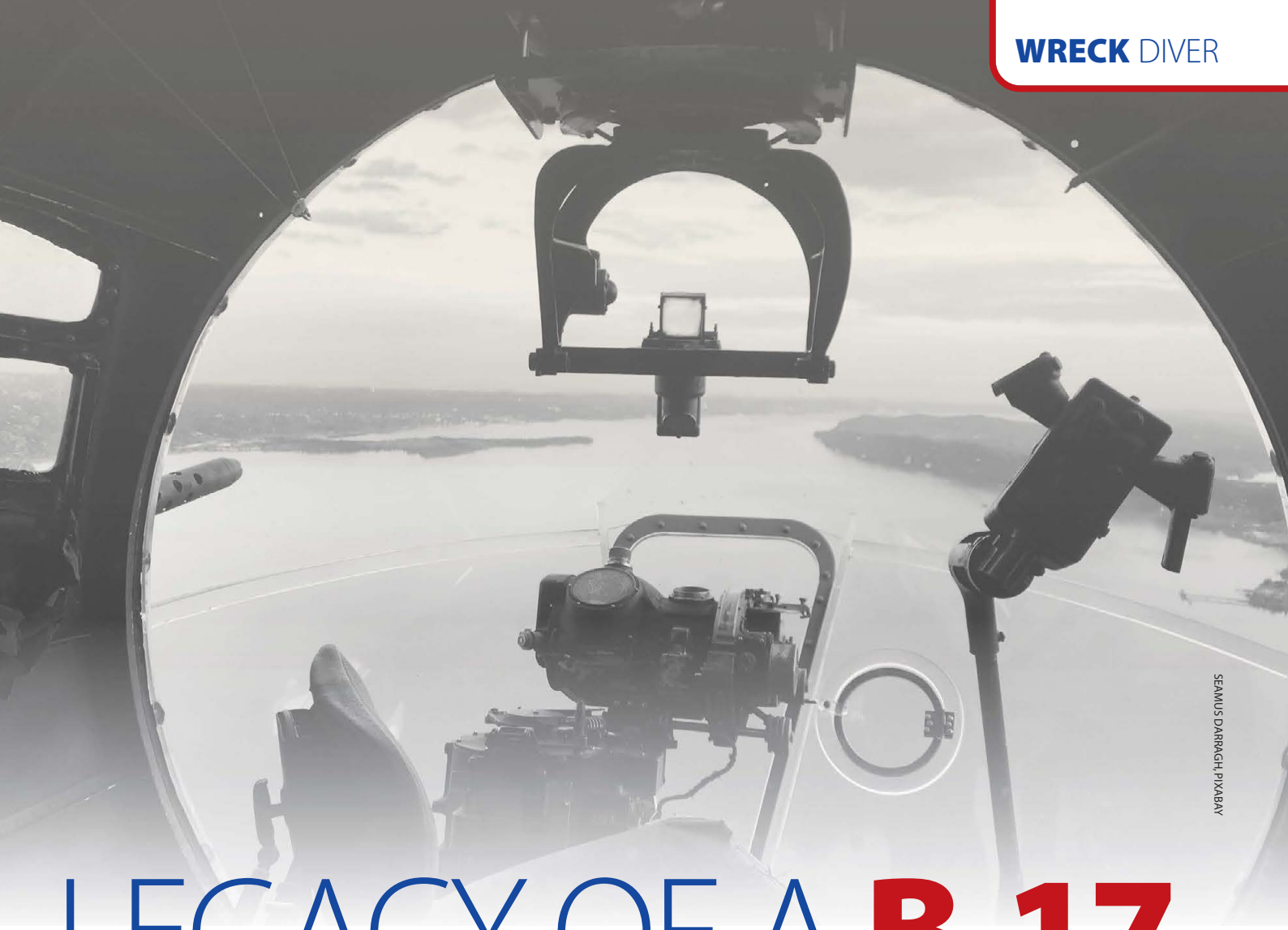


SEAMUS DARRAGH, PIXABAY

LEGACY OF A B-17

It was a regular occurrence for JOHN CHRISTOPHER FINE to dive a Flying Fortress bomber wreck off Corsica in the '90s. Then he made a chance discovery

"**WE LOST THREE B-17s** over there. Two before the one that crash-landed off Corsica. One we had engine problems. We had a belly landing. All of us got out.

"The second was over Athens harbour. The Germans had supply ships in the harbour. They fired on us. We had a punctured fuel-line and were shot up. Our left wing burst into flame. We all got out of that one too. The third one…"

Armand C Sedgeley is 99. His mind is as clear and sharp as when he was a 20-year-old second lieutenant bombardier assigned to a B-17 Flying Fortress squadron during WW2, first in North Africa and then in the European theatre.

His third B-17 bomber is one that I explored in 1993, under water in the Mediterranean. It's a tale of discovery, adventure, courage and luck.

On 14 February, 1944, Lt Sedgeley and the crew were on a bombing mission over Italian railway lines.

Attacked by Messerschmitts, their B-17 was disabled. The captain left formation and diverted to Corsica.

Calvi's airfield was in ruins, so they couldn't land there. They ditched in the sea in front of the citadel. Seven men got out in a life-raft and were rescued. Three others were left dead inside.

The aircraft filled with water and sank. The tail-section containing the dead tail-gunner broke off on ditching. It was lost in deep water beyond the main fuselage.

War is never romantic for those who fight. Combat is brutal, fearsome and destructive. It is only memory of brave deeds long after the conflict is over that resounds with glory.

I wasn't the first to discover the B-17. Long after WW2, commercial divers had found it at a depth of about 37m off Calvi, the ancient walled city said to have been the birthplace of Napoleon.

I'm a marine biologist. While studying the effects of pollution that created algal blooms visible from rugged cliffs to the south of the French island of Corsica, I began diving on the B-17 wreckage.

I was working with Dr Daniel Bay of the University of Liege in Belgium, director of the school's field biology station. Called Stareso, it's carved out of rock on a bay at the tip of a peninsula

Left: The city of Calvi – the sunken B-17 crash- landed right in front of its citadel wall.

more easily accessed by boat than over a track that had claimed many axles.

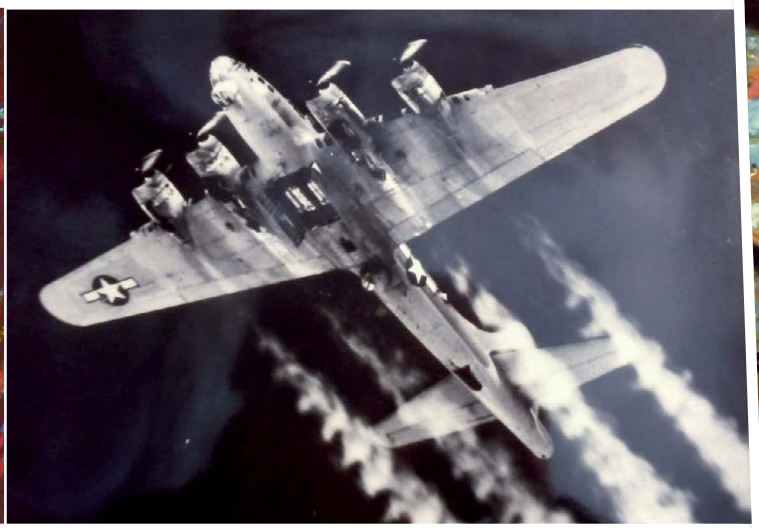
Hapless drivers had also lost vehicles falling over the unguarded cliffs onto the rocks below. The underwater terrain is as rugged as the mountains that reach down to the sea, and it was there that I dived extensively for my research.

That year I decided to make a film, to help me understand how the corals and other attaching organisms grew.

I needed a known substrate, and knew that the B-17 would be ideal.

I had dived the bomber often. I would take Stareso's glass-fibre runabout to the site, located using transits. I would anchor and spend hours exploring, requiring long decompression times.

The bomber was upright on a sandy bottom and I photographed it. As a Fellow of the Explorer's Club, I carried the club flag to Corsica on a project that included my underwater work off Calvi.



Above, from left: The pilot's seat and controls of the sunken B-17; a Flying Fortress in action.

Right: The iodine ampoule found in the wreck.

My camera, equipped with powerful underwater movie lights, weighed 18kg negatively buoyant, so I'd sink like a rock. It carried 122m of film.

I would place it on the sand outside the fuselage while I explored the wreckage.

The aircraft was mostly intact. The nose had broken off and the tail-section was gone. Entering the fuselage was risky – it was easy to get hung up in dangling electrical wiring and cables – but the wreck's integrity was amazing. I could even work the control panels on the wings.

Entering the top turret would let me down behind the pilot's compartment. The first time there I saw something white and billowing behind the co-pilot's metal seat. On inspection I discovered it to be a silk parachute unfurled from its pack.

The plane had crash-landed and nobody had baled out but what seemed remarkable was that the fabric had survived for so many years in salt water.

Dan Bay had put on weight, and was complaining that his old wetsuits must have shrunk. Wanting to film him, I motioned for him to slide down through the top turret. With the Plexiglas covering blown away, it was just an opening.

Dan's legs disappeared into the hole – but then his body got stuck like a cork in a bottle. I can still see his expression of flushed, comic anger as he motioned for me to get him out.

I laughed until my mask filled with water as I began taking pictures with my stills camera. "You were trying to get rid of me," he exclaimed when I surfaced much later. We still laugh about it. Dan never again tried to enter the fuselage.

The propellers were intact but the ends of the blades had bent on impact. The ailerons moved freely and were intact except where some careless anchoring by fishing boats had caused damage.

Dan told me that the remains of crew had been discovered by commercial divers long after the war. They had contacted the mortuary service at a US base in Germany, and a team had come out and engaged the divers to retrieve the bones – which they had managed to mix up in the process. But the relatives had been notified and the remains buried in the USA.

That pretty much ended local interest in the bomber. Corsica was rebuilt after the war, and diving was a little-known pastime. Calvi was relatively remote, even for Corsicans.

The bomber remained a mystery, and one I had no special interest in solving – until one day on a dive when something unexpected occurred.

I HAD FINISHED filming, and looked at my dive-watch. I had plenty of air left in my twin-set and decompression would not be a problem. Wearing a good Beuchat wetsuit with attached hood I felt warm enough in the 18°C waters.

Leaving my camera on the sand, I entered the plane where the tail had come apart from the fuselage. I pushed cables and wires aside, untangled my regulator twice, slid past bulkheads and past the bomb-bay to a place where years of sediment and debris covered the floor.

For some reason I began fanning the debris with my gloved hand at this spot. My gloves were well-worn and my fingers stuck out of holes. I would tell people that this was deliberate so that I could trigger my camera, though in fairness my suit wasn't in much better shape.

My fanning reduced visibility but left a little hole through which I saw a piece of what looked like a wooden lid. Wood is usually eaten by sea-worms or deteriorates quickly but, covered in sand and silt, this was intact. I recognised it immediately as the top of a first-aid box.

I lifted it up, and underneath found an intact ampoule of iodine, which I placed in my vest-pocket as carefully as I could.

I gently fanned the hole again. The third pass revealed something. I reached for it. Silt again fell into my little hole, and I fanned again. By now there was little visibility inside the fuselage, and I was concerned that I'd lost the object.

Fanning again I exposed it, tried to pick it up but lost sight of it. I fanned once more and held the tarnished object close to my mask. I could read its inscription, and at once decided what I would do.

I placed the object next to the ampoule, sealed the pocket and made my way mostly by feel back out of the fuselage. My watch indicated that I would have to make three long decompression stops.

I picked up my camera, finned over to the anchor-line and ascended. On my first two stops I held the camera between my legs but at 5m I was able to clip it onto a line and was at last free of its weight.

I could see Dan looking down over the side of the boat through the clear water, an expression of combined mirth and

disapproval on his bearded face. Why, this told me, had I delayed his lunch-hour? He pulled my camera up, another 15 minutes passed and I was back on board.

Dan started the outboard engine. I hauled in the anchor and sat against the steering pedestal on the plastic bench seat. As Dan headed back to Stareso and began to growl about my frivolous disregard for his appetite, I opened my vest-pocket and handed him my find.

"Fine," he growled. "Only you, Fine. You could be the only one to find this." That was all he said.

We reached the pier. I set my dive-vest in the shade and helped tie up the boat and rinse our equipment as Dan sought the wonders of his wife's culinary skills.

Before entering the kitchen I found a small lidded plastic container, filled it with fresh water, deposited my treasures in it and secured them in a locker.

Dan asked no more about my find until after lunch, as we enjoyed an *espresso* on the terrace overlooking the bay. "I will find the survivors," I told him. "We will create a memorial for the men who lost their lives in the war."

Dan well knew the torture of his fellow-Belgians during WW2, of Nazi invasion, defeat and occupation of his country. Corsica had been a hub of resistance, the key to secret pre-D-Day Allied operations.

I knew that the brave, independent Corsicans would become allies in my planned project.

AFTER COMPLETING my work in Corsica I flew to Toulon to stay with my friend Philippe Tailliez and work on his project and book.

Tailliez was the father of diving. He had joined the legendary Frederic Dumas spearfishing before the Nazi occupation of France. They had explored the entire coast and offshore islands around Sanary sur Mer, where Dumas lived.

One day Tailliez saw a debilitated ensign who had been assigned to his ship coming aboard. He knew that the young officer, Jacques-Yves Cousteau, had been in a car accident and that surgeons were insisting on amputating his arm, and that he had refused. Recuperation and exercise would rehabilitate him, Tailliez decided, taking Cousteau under his wing.

When next he joined Dumas, Tailliez took Cousteau along – the start of what would become a long association that he later called "*Les Trois Mousquemers*".

Above, from left: Dan Bay inside the B-17's narrow fuselage; John Christopher Fine is in the top turret of the aircraft with the Explorer's Club Flag, Bay beside him.

Their journey together would see the development of equipment that would free underwater explorers from cables and air-hoses attached to the surface.

With the scuttling of the French fleet in Toulon in 1944, the naval officers were left at liberty. The Three Musketeers dived, fabricated dive equipment and were left alone by the Nazi occupiers in a mostly Vichy-run part of France.

After the war the French Navy created the Undersea Research Group and put Commander Philippe Tailliez in charge. He had chosen Cousteau to join him and hired Dumas, the youngest of the three, as a civilian employee.

Dumas had died as a result of chain-smoking. When I arrived at Tailliez's home I was told that a street in Sanary sur Mer was to be dedicated to his old friend the next day, and I was to go.

We had a late dinner prepared by Tailliez's bright, blue-eyed spouse Josie. I bunked in his fisherman's house on the *corniche* on the outskirts of Toulon.

Next day thick rain was pelting down. It was a cold, raw morning. Tailliez drove and we took many wrong turns before we arrived at the beach. There was no one there. Fog shrouded the sea and moved over the land with a morning wind.

We thought the event must have been cancelled. After what seemed like an hour we were preparing to leave when we heard music. A procession including the mayor and dignitaries emerged from the town.

Speakers filed onto a platform on the bay where Dumas had often dived. A lone figure emerged from the fog – the now celebrated Jacques-Yves Cousteau.

AFTERWARDS WE WERE invited to a friend's home, set high above the harbour. We were offered food and drink, a fire was lit in a brick hearth and the three of us were left alone to talk.

There was intimate conversation between the two old friends, reunited at a memorial for the first of them to die. Music drifted faintly across the bay from a carousel somewhere on the mainland.

Cousteau looked at me as he and Tailliez paused in their reminiscences, and I remembered the object I had found in the B-17. I took it from my pocket, unrolled the tissue paper in which I had placed it for protection and handed it to him. "*C'est un miracle que tu est la,*" said Cousteau.

He held the American dog-tag. The two former French naval officers understood what it signified. Perhaps it was a miracle to receive this message from the past.

Cousteau read the inscription I had read under water days before: "R H HOUSEHOLDER 37331759 T42-43 A MRS R H HOUSEHOLDE RT 1 BOX 312 P WELLINGTON, COLO." A hole drilled to take a chain blocked the last R of Mrs Householder's name.

I revealed my plan to these friends

who had lived through defeat, occupation, oppression and collaboration. I would research the B-17's history and, if I could find survivors, would bring them to Corsica for a memorial celebration that would recall the sacrifice of so many brave souls to restore liberty.

There were tears in Tailliez's eyes, and Cousteau was visibly moved, embracing his old friend. Mortality and heroism had been recalled by this small, notched dog-tag. Tailliez' thin, bony fingers reached out and gripped Cousteau's shoulder.

The wood fire crackled. Olive wood, scented with myrrh.

"So many ride the carousel," I said in French. "So few grasp the brass ring."

"Yes," Cousteau said, his voice muted.

BACK IN THE USA I began calling and writing letters to Army and USAF (the US Army Air Corps until 1948). There were no responses.

Then, just a couple of weeks before I was to go to Corsica to MC its underwater film festival, I took a call from a colonel in the US Secretary of the Air Force's office.

While shredding confidential documents he had come across my letter to the Secretary. He had studied history and said the letter had interested him.

He asked if anyone helped me, I said no and told him about the ceremony I had hoped to arrange once back in Corsica.

Two hours later he called back. He had found two survivors. One was the pilot but he couldn't leave home – his brother was near death and he was infirm.

However the bombardier, Armand C Sedgeley, was keen to participate.

Above, clockwise from top left: Tailliez, Fine and Lt Sedgeley on the dive-boat at Calvi; Fine unfurls the US flag and the dedication plaque; Fine at Calvi's Place de Mort, with the flag and a machine-gun taken off the B-17 illegally by German divers. They were caught by French police.

Below: The dog-tag that started it all.

Technical Sgt Robert Householder, the B-17's radio operator, had been killed in the Messerschmitt attack.

I was able to get a front-page story in the newspapers, a bronze plaque made and Lt Sedgeley over to Corsica.

All this resulted in the very last official memorial tribute for WW2 at its 50th anniversary. Corsicans turned out in great numbers for the ceremony.

The US president sent greetings and there were honour guards from the USAF and French Foreign Legionnaires.

A grand reception with the governor was followed by a splendid luncheon in the Port of Calvi with veterans and government officials.

At the ceremony an older man came up and asked me to translate for him. A Corsican patriot in the resistance, he had been standing guard at the lighthouse more than half a century ago and had seen the B-17 crash-land in the sea.

He wanted to thank Lt Sedgeley and shake his hand.

TAILLIEZ AND I took the plaque out to the wreck-site. We stood together in the small dive-boat as the Archbishop of Corsica offered a prayer before signalling me to swim to the stern of the cruise ship carrying him along with other dignatories and members of the press.

As I looked up, he dropped a vial of holy water into my outstretched hand. I swam back to the dive-boat and Tailliez handed down the bronze plaque.

Its weight sent me to the bottom immediately. I could only walk and crawl it to the sunken aircraft.

I placed it, unfurled an American flag, opened the vial of holy water and anointed the place where three members of the US Army Air Corps had sacrificed their lives for freedom. Seven had escaped, two of whom I had found alive.

One was on the cruise ship above. He had been honoured at the ceremony with medals and tokens of esteem. I was under water, alone with my treasure.

breakthrough biology

KATE SPROGIS / AARHUS UNIVERSITY

In this occasional series, **DIVER** looks at the latest scientific research shedding light on long-preserved marine-life mysteries

HUMAN INTERACTION with whales in most parts of the world is limited to snorkelling or simply watching from a boat-deck to avoid undue disturbance of the mammals, though many scuba-divers find that they can build one or other activity into their diving holidays.

But according to a new scientific study, it seems that the boats that bring people out for whale encounters can still present a problem, in the form of unwanted noise.

Whale-encounter operators tend to position their boats as close to the whales as they can within local legal limits, which can vary from simply staying behind them to keeping at least 100m away.

AUSTRALIA

WHALES FEEL THE DECIBELS

However, even with the stricter distance rules it's known that whales can still exhibit signs of disturbance. This might include diving, changing course, swimming faster, breathing more often, dispersing and emitting sounds outside normal patterns, says Australian biologist Kate Sprogis, who led the team from Aarhus University in Denmark.

"Unlike humans, the dominant sense in whales is not sight – it is hearing," she says. "While whales might be unable to see a boat 100m away they are likely to hear it, so it makes sense to consider this when stipulating whale-watching guidelines."

Previous research into the long-term consequences of disturbing whale mothers has established that the energy they expend in response reduces the amount of energy available for evading sharks, orcas or unwanted males, undertaking long migrations and in particular feeding their offspring.

The calves need to take on a lot of milk in a short time to be strong enough to migrate without falling victim to predators.

The researchers carried out experiments in Exmouth Gulf on Australia's west coast, a resting area for the world's largest population of humpback whales. The whales winter there, not feeding but suckling their calves ready to migrate to cooler feeding grounds in summer.

Above: Humpback mother and calf resting in Exmouth Gulf.

On 42 occasions the researchers drove their boat to within 100m of a mother and her calf. They then used underwater speakers to emit different levels of engine noise, monitoring the whales' response from above using a drone-mounted camera (from which pictures like the one above was taken).

The loudest boat noise of 172 decibels caused the whale mothers' resting time to drop by 30%, doubled their breathing rate and increased their swimming speed by 37%, though they would often return to a state of rest as the noise receded.

While noting that a number of whale-watching boats were already sufficiently quiet, the study concluded that to minimise impact on whales, engine-noise levels should be capped at 150dB.

This might comes as a surprise, because for human ears 150dB is close-to-the-speaker rock-music loud! But it is recommended that this should be introduced as a worldwide standard.

The research project was funded by the EU's Horizon 2020 research and innovation programme Marie Skłodowska-Curie Actions. The study is published in the scientific journal *eLife*. ■

USA

How crystals enable fish to navigate

HOW DO OCEAN-SPANNING salmon find their way back to the river in which they hatched years before when it's time for them to spawn? US scientists believe they have come closer to solving the long-standing mystery.

A new study by researchers led by Oregon State University (OSU)'s College of Agricultural Sciences suggests that the fish use chains of microscopic magnetite crystals embedded in their tissue as both a map and compass, allowing them to navigate using the Earth's magnetic field.

The team subjected juvenile chinook salmon (*Oncorhynchus tshawytscha*) to a brief but strong magnetic pulse.

Such pulses reverse the polarity of magnetic particles and are known to affect magnetic orientation behaviour in many species such as bats, birds, sea turtles and lobsters, but they had never before been linked to behavioural changes in fish.

The pulsed salmon's behaviour was compared with that of "unpulsed" control fish in a magnetic coil system.

The scientists found that if they shifted the "magnetic map", the control

OREGON STATE UNIVERSITY

fish would be randomly oriented, but the pulsed fish would display a preferred heading.

The iron ore magnetite, or lodestone, is the most magnetic of the Earth's naturally occurring minerals, but the researchers believe that the salmon use the crystals to navigate only while they're in the sea.

"In the river they seem to rely upon chemical signals," said Prof David Noakes of OSU, adding that research was continuing into the fishes' ability to return to the exact spot where they hatched.

"We're trying to figure out the life-cycle of the salmon from the points of highest information – when they go from fresh water to salt water, and when they turn around and come back."

Prof Noakes believes the magnetic pulse could have affected the fishes' map, compass or both.

"In the big picture, these salmon know where they are, where they're supposed to be, how to get there and how to make corrections if needed," he said.

"While they're in fresh water, they're imprinting upon the chemical nature of the water. When they hit salt water, they switch over to geomagnetic cues and lock in that latitude and longitude, knowing they need to come back to those co-ordinates.

"And when they decide to come back, it's months in advance because they're halfway to Japan."

The study is published in the *Journal of Experimental Biology*.

Above: Chinook salmon swimming upstream.

Below: Plastic makes hermit crabs less discriminating.

UK

Plastics mar hermit-crab home-making

HERMIT CRABS ARE becoming less discriminating when it comes to picking out a new home – and it seems to be the fault of plastics pollution.

New research from Queen's University Belfast and Liverpool John Moores University has added to the weight of scientific evidence that the ocean microplastics crisis is posing a serious threat to biodiversity.

As much as 10% of global plastics production is believed to end up in the sea, and the study focused on how this

QUEEN'S UNIVERSITY BELFAST

affected hermit crabs, which are considered a key component in balancing the marine ecosystem.

Hermit crabs use snail-shells to protect their soft abdomens, upsizing constantly to bigger homes that enable them to grow, reproduce and survive.

The researchers divided the test crabs between experimental tanks, half of them containing microplastics and the others none. After five days they were moved into low-quality shells but with the option of alternative high-quality shells that offered more protection.

It was found that after being exposed to microplastics the crabs became less inclined to touch or enter the high-quality shells.

"Our research shows for the first time how microplastics are disrupting and causing behavioural changes among the hermit-crab population," said Dr Gareth Arnott, lead researcher from the School of Biological Sciences at Queen's University.

"These crabs are an important part of the ecosystem, responsible for 'cleaning up' the sea through eating up decomposed sea-life and bacteria.

"By providing a hard, mobile surface, hermit crabs are also walking wildlife gardens. They host over 100 invertebrate species – far more than live snails or non-living substrates.

"Additionally, commercially valuable species prey on hermit crabs, such as cod, ling, and wolf-fish. With these findings of effects on animal behaviour, the microplastics pollution crisis is therefore threatening biodiversity more than is currently recognised, so it is vital that we act now to tackle this issue before it becomes too late."

The research is published in the Royal Society's *Biology Letters*.

SOUTH AFRICA

What's that sound? It's only a diving penguin!

RARELY DO SCUBA-DIVERS get to witness penguins hunting under water but if you should be lucky enough to do so, have a listen.

The first evidence has just emerged that the seabirds vocalise while they're diving for food.

Penguins are like all seabirds in being highly vocal on land, which helps them to recognise and communicate with mates and kin during breeding season.

KEN FUNAKOSHI

Above: Who knew that penguins were able to sound off under water?

Below right: Striped catfish feeling the heat on the reef.

However, they spend the rest of their lives at sea where, unlike most seabirds, they are equipped to carry out often extreme dives while hunting for fish, krill or squid.

A team of researchers led by Andrea Thiebault from the Marine Apex Predator Research Unit (MAPRU) at South Africa's Nelson Mandela University took advantage of recent technological developments to carry out research that would previously have proved challenging.

They caught specimens of three species of penguin – king, gentoo and macaroni – as they headed out to sea from their breeding colonies at Marion, a sub-Antarctic island off South Africa.

They then attached miniaturised video-loggers with built-in microphones to their backs and let them go.

The species were selected for their diversity of feeding strategy. King penguins venture as deep as 200m in search of fish, while macaronis feed mostly on schooling krill no deeper than 10m, and gentoos pursue a variety of prey at a range of depths.

When the cameras were retrieved after a single foraging trip, the results surprised the researchers.

They had captured 203 underwater vocalisations from all three species over almost five hours of underwater footage. Most of these (168) came from the gentoos, with 34 from two king penguins and just one from a macaroni penguin.

All the vocalisations were short and emitted during hunting dives, 73% of them during the "bottom-time" rather than on descent or ascent. More than half were directly associated with hunting behaviour, immediately after the penguin had accelerated in pursuit of prey or straight afterwards, and the vocalisations were more numerous among those penguins feeding on fish.

Now the scientists want to find out how penguins are able to produce such sounds given the high pressure at depth.

They also want to understand their purpose, whether they are signalling the same information and whether they produce other underwater sounds in different contexts.

Possibilities are that the sounds are used to help the birds adjust their buoyancy, to startle their prey or to fulfil a social function with other penguins. The study is published in *Peer J*.

AUSTRALIA

The fish feeling the heat

SOME FISH ARE better than others at coping with heatwaves – that's the conclusion of what is said to be world-first international research using advanced genetic-analysis techniques.

Scientists have tracked how wild coral-reef fish populations responded to the severe marine heatwave in 2016, which they say killed a third of the corals on Australia's Great Barrier Reef.

That event was followed by a second the following year – and a third severe event began recently.

"Our study shows that reef fishes are directly affected by heatwaves, but their responses vary greatly between species," said co-author Dr Jodie Rummer of the ARC Centre of Excellence for Coral Reef Studies at James Cook University.

VICTOR HUERTAS / ARC

A fish's performance and survival depend, say the scientists, on regulation of its "gene expression".

This is the process by which a gene's DNA translates into the RNA that controls when and how many proteins are made, and dictates how cells function. Studying gene expression can explain how fish respond physiologically to environmental shock.

Working at Lizard Island, the team tracked changes in the expression of thousands of different genes in five species of coral-reef fish collected at different times before, during and after the heatwave. Concentrating on two species of damselfish and three of cardinalfish, they were able to identify how each species reacted to raised temperatures.

"The spiny damselfish responded to the warmer conditions with changes in the expression of thousands of genes, suggesting it is particularly sensitive to heatwaves," said co-lead author Dr Moisés Bernal of Auburn University. "Other species appear to be more tolerant, with fewer changes in gene expression."

"Marine heatwaves are becoming more frequent, more severe, and are further exacerbated by climate change," said Dr Rummer. "We found the physiological mechanisms the fish used to cope with the warmer waters changed as the heatwave progressed…

"Over time, the fish may adapt to rising temperatures, or even migrate to cooler waters."

The scientists hope it will be possible to screen larger number of species in future.

Publication of the research in the journal *Science Advances* coincides with what has since proved to be the Great Barrier Reef's third major bleaching event in five years.

Above left: Fish swim over bleached coral at Magnetic Island in March 2020

NETHERLANDS

Viruses bow to killer sponges

WHILE THE WORLD IS preoccupied with one particular type of virus, scientists estimate that there could be trillions of species present on the planet – and that in the ocean one millilitre of water alone will contain several million virus particles.

These viruses don't have it all their own way, however. Marine ecologist Jennifer Welsh and a team from the Royal Netherlands Institute for Sea Research (NIOZ) recently demonstrated that some sea creatures prey on viruses rather than being infected by them – and claim that by doing so they might have saved humans from many possible viral contagions.

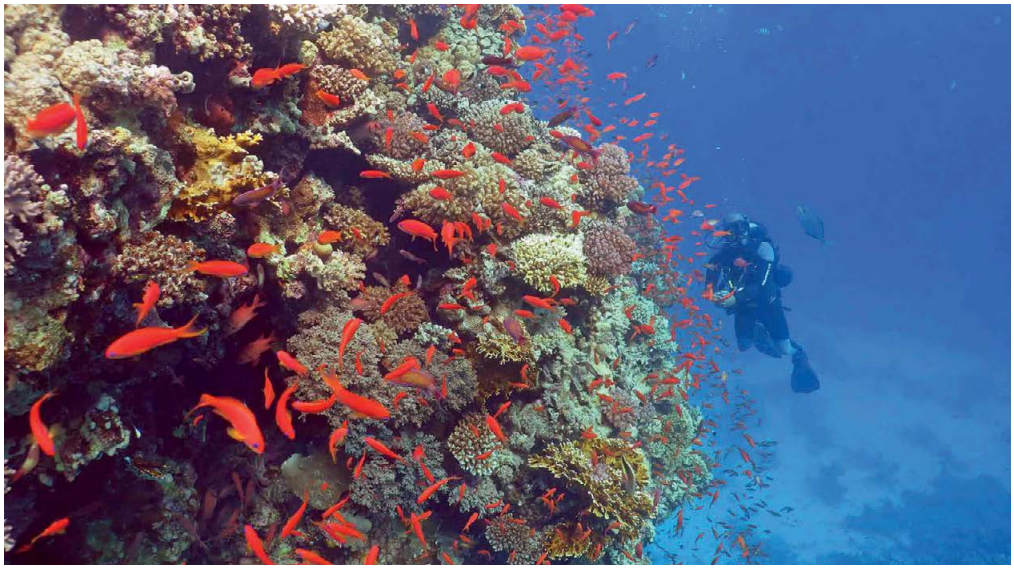
In a lab-created environment the researchers examined how 10 different marine animals succeeded in removing viruses through active predation, filter-feeding or putting up barriers to entry. Included were anemones, polychaete larvae, sea-squirts, crabs, cockles, oysters and sponges. And the most efficient virus-killers? Sponges.

Breadcrumb sponges (*Halichondria panicea*), common in the North Atlantic and Mediterranean, showed that they could remove 98% of viruses in one day – with 94% eradicated within only three hours. Even when new viruses were added to the water every 20 minutes, the sponges were able to cope efficiently.

Crabs were the runner-up virus-killers, wiping out 90% in 24 hours. Cockles came third with 43%, with oysters lagging behind at 12%.

The scientists conceded that the situation would be more complex for the animals in the wild as a result of all the other animal species influencing their behaviour, currents, temperature and light conditions. However, they suggest that the natural ability of animals such as sponges to kill viral pathogens could be harnessed, particularly in areas such as aquaculture farming.

The findings are reported in *Nature Scientific Reports*.



STEVE WEINMAN

Above: Corals in the northern Red Sea find themselves protected in a 'thermal refuge'.

Below: *Halichondria panicea* sponge, a silent killer.

SAUDI ARABIA

Northern Red Sea is a heat sanctuary

THE RED SEA IS traditionally the favourite escape for UK scuba-divers, and that choice could prove fortunate for them in future.

As climate change causes ocean temperatures to rise, the northern Red Sea has been shown to host heat-resistant reef-building corals that make it a unique "thermal refuge". But why is that the case?

The question is being asked in a large-scale research programme undertaken by KAUST (King Abdullah University of Science & Technology) in Saudi Arabia.

Marine scientists from its Red Sea Research Centre also led a recently published international study that concluded that global damage to marine life could be reversed within a generation – if the will was shown to take the necessary steps.

Throughout most of the world, coral-bleaching occurs when mean summer maximum temperatures in a region are elevated by only 1-2°C.

In the northern Red Sea, in contrast, temperatures would need to rise by 5° to have the same effect.

"It seems that northern Red Sea reefs constitute a global coral-reef refuge that deserves our attention and protection," says KAUST marine scientist Prof Christian Voolstra, adding that the area "is the only place on Earth that I am aware of with this characteristic.

"These coral reefs have a climate-change insurance for the next 100 years. We should make sure that this resource is conserved, and we should also invest in the research to figure out why this is the case."

The study aims to pin down genomic differences between the resilient northern and more vulnerable southern Red Sea corals. One theory is that the Red Sea was disconnected from the Indian Ocean some 15,000 years ago, drying out before refilling and being recolonised by corals that had to pass through warmer southern waters.

Only those with high thermo-tolerance would have survived the journey.

Another possibility is that thermotolerance results from the northern Red Sea's higher salinity, which is normally associated with warmer temperatures and increased evaporation.

Red Sea corals are bleaching in the south with its higher temperatures, and to a lesser extent in the central region.

"In the Red Sea in the summertime the average water temperature is above 32°C," says Prof Manuel Aranda, "and this would kill – basically wipe out – corals in the Caribbean, on the Great Barrier Reef etc.

"However, corals here can survive these temperatures, and we're very much interested in finding out why – and of course how – so we can use this knowledge to help corals elsewhere."

Their Saudi Arabian base gives the KAUST scientists the ability to access the entire range of Red Sea corals from north to south, and they say that the nature and range of their research programme is unprecedented in the Red Sea.

"We need to act in the coming 20 years to save as many reefs as possible until we have developed or engineered broader solutions to counter the effects of a changing climate," says Voolstra.

THE LONG GAME

Continuing his tour of some of the best elements of Scottish diving, ROSS MCLAREN takes us on a tour of Loch Long on the west coast

I'M NOT SURE WHY, perhaps it's just me, but I think we sometimes overlook what we have right on our doorsteps. Rather than being appreciative we can become indifferent, and in some cases even contemptuous, of things we see and experience regularly.

When it comes to diving on the west coast of Scotland, I think this tendency is particularly relevant to Loch Long.

If you're a diver from Scotland who dives home waters it's pretty much guaranteed that you'll have dived in this loch, whether it be on training courses or for fun.

I also think it's safe to say that if you're a regular diver there, you're probably a little fed up with diving in Loch Long.

But when I sit down and think about it, I do wonder if we should be showing this body of water more appreciation.

It's 20 miles in length but Loch Long doesn't get its name from its dimensions. Loch Long in Gaelic translates to Ship Lake, and the name dates back to 1263 when the Vikings saw Arrochar, at the top of the loch, as a key target from which they could drag their ships across land to attack the unprotected settlements of Tarbet.

Brief history lesson over, back to diving. There are 13 Loch Long dive-sites listed on the website Finstrokes, a surprising number for one body of water, and all within an hour's drive of Glasgow city centre.

Until I started researching this piece I hadn't realised that there were so many, and I admit that I have yet to dive all of them.

In my opinion, however, there are four that stand out as being well worth a visit if you're up this way.

As with other dive-sites around the country, different clubs and dive-schools sometimes seem to have their own names for each location, but I'll try to include as many of them as possible.

Finnart / A-Frames

Finnart, sometimes referred to as A-Frames, is probably Loch Long's most popular site. In fact it's arguably the most popular in Scotland. It was built by the Americans during WW2 to provide a deepwater oil terminal within the defensive ring of the Clyde, and if you've taken part in any training courses there you'll have done at least one dive on A-Frames. But the site isn't just for trainees.

At Finnart you drive into an excellent car park (which gets very busy on summer weekends) and an entry-point that's pretty good,

Pictured: The Finnart/ A-Frames dive-site.

Below: Sealoch anemone in Conger Alley.

although the small scramble down to the beach does call for some care.

Once you dive beneath the surface you find an extremely diverse site that has enough to satisfy everyone from those taking their first breaths under water to the hardcore experienced.

Study the wreckage from the old pier found at 8-12m and you find a huge amount of life clinging to it, providing a superb introduction to the site. If depth isn't your thing you could spend a full dive in and around this debris field, zig-zagging the slope and exploring all the nooks and crannies that are home to squat lobsters, edible and velvet swimming crabs – the list goes on.

Diving a little deeper, below 20m, we come across the great A-Frames, the remnants of the old pier that give the site its alternative name.

These huge structures often appear very suddenly (I might have swum into them on one or two occasions) and a vibrant cacophony of life greets us.

The frames are covered in anemones, starfish, dead men's fingers and, if you're lucky, the odd nudibranch. If you get a day with particularly good visibility, the view from the seabed towards the top of them is spectacular.

If you're keen to log some deeper dives, there is the option to head further out into the loch from the shore, and it's easy enough to get 40m-plus, with some pretty spectacular fireworks anemones found at these depths.

29 Steps

This site is just north of Finnart – and when I say "just north", you could swim to it from Finnart (I might have got lost once and ended up there, but that's another story).

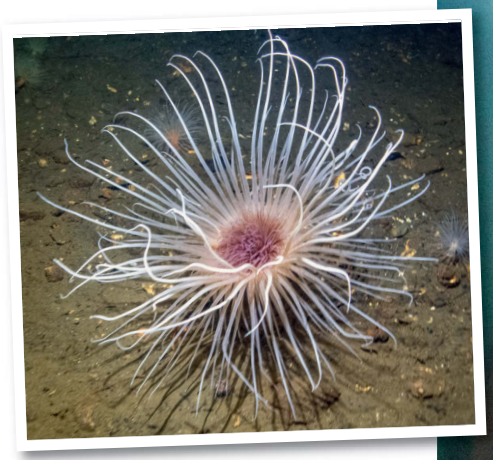
Seen by regulars as more of a training site, so perhaps less exciting than A-Frames, 29 Steps is a nice dive with a very easy entry and exit and simple navigation.

The name comes from the number of steps that used to lead down from the road to the beach (in fact there are only 26 now).

The main hazard at this site are the steps themselves because they can be quite slippery when wet, but once you reach the bottom you find a rather nice wee beach with the remnants of an old jetty stretching out into the water.

The old jetty wall offers a convenient perch for dive-gear and there is even a small sheltered archway that can be used to escape the rain on a dreich Scottish dive-day.

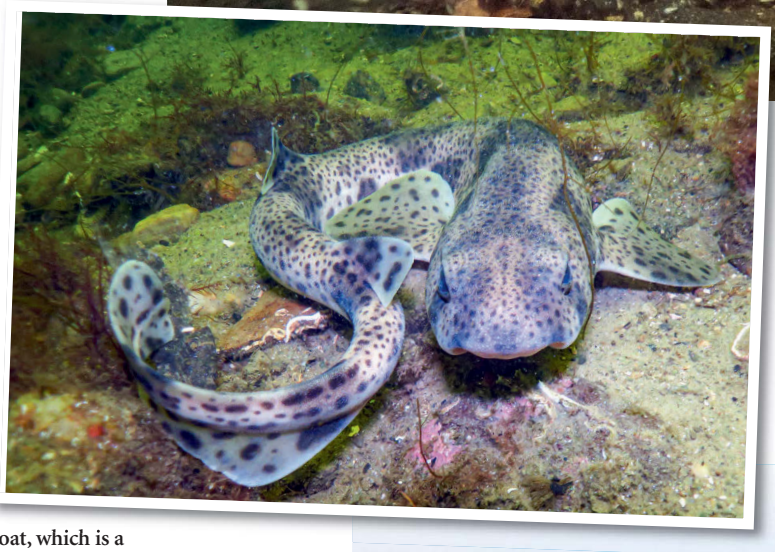
The main dive is straight out



from the beach down a gentle slope to a platform at around 9m that offers an excellent base for training and practising skills.

There isn't that much life on the platform (precisely because it's regularly used for training), though velvet and edible crabs can be found in and around it, and a few other bits and pieces as well.

From the platform there are two options. The first is to follow the slope down as far as you like, to find once again a variety of crabs, squat lobsters, starfish and even the odd fireworks anemone and langoustine at depth, and then turn left to zig-zag back up.



Option two, which can also be done in combination with option one, is to continue down a little deeper from the platform and then bear left perpendicular to the slope.

Finning along you eventually come to the "wreck" of an old rowing-boat, which is a popular habitat for critters and even, if you're lucky, the odd flatfish among the debris. On the way back to the entry/exit point there is also a small artificial reef based on discarded dive-tanks deposited in the sand.

29 Steps is less exciting than near-neighbour Finnart, but is undervalued and does provide a decent alternative should you arrive to find A-Frames mobbed, as it can be at weekends.

Twin Piers

Heading to the top of the loch and round onto the west side, you eventually come to Twin Piers. You'll know it because sitting just off the beach are the remains, funnily enough, of two piers.

Lying in the shadow of one of Scotland's most popular hill-walks, the Cobbler, both Twin Piers (and my final site Conger Alley) can offer sights beneath the waves just as spectacular as those from the mountain that towers over it.

Parking for Twin Piers can be tricky if you happen to turn up on a busy day. This requires driving slightly past the entry-point to find space on the grass verge. This also relates to one of the main hazards of Twin Piers – the extremely busy and fast road beside which it sits.

An excellent path leads back to the entry, but I would strongly urge you to take great care when walking to the site laden with heavy gear, because lorries and coaches often hurtle past at speed.

The beach sits at a lower level, and the second hazard is the ladder you must use to get down from the original "entrance" of the pier. It is secured and a handle has been drilled into the wall so it's not that tricky, but worth mentioning.

Twin Piers is an excellent site for divers of all abilities, and navigation is straightforward. From the beach, head straight out between the piers and drop down. On the slope you'll be met with an impressive carpet of discarded bivalve shells. Continue to anywhere between 10 and 15m and bear left perpendicular to the slope.

If lucky you'll eventually hit the chassis and axles of an old truck that fell off the pier. From there I'd suggest heading down to 15-20m and continue to swim perpendicular to the slope until you eventually reach an excellent rocky reef.

The boulders there are enormous and offer a fantastic habitat to an array of life including crabs, squat lobsters, anemones, starfish and dead men's fingers.

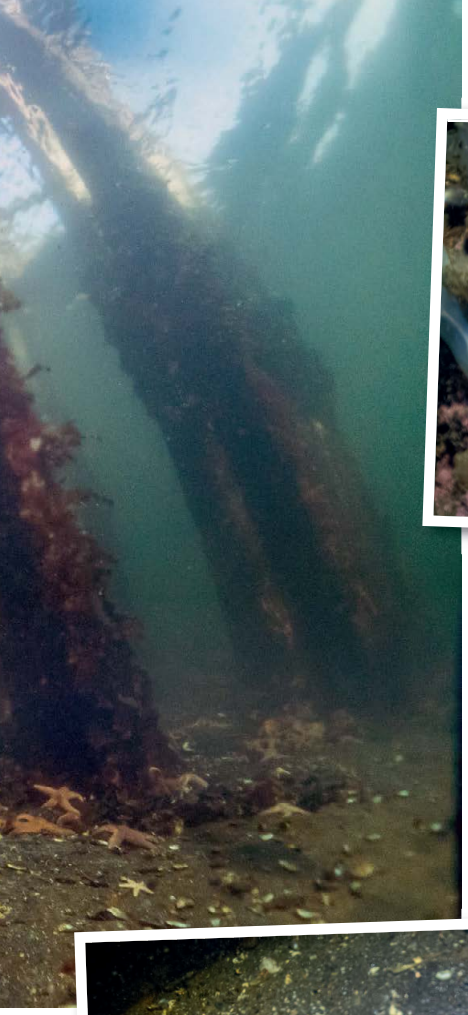
But the real attraction of Twin Piers is the possibility of seeing conger eels. and even the odd lobster. These make their homes in the larger cracks in, around and under the huge boulders.

Top left: Fireworks anemone at Twin Piers.

Top: Twin Piers.

Above: Dogfish at Finnart.

Right: The 29 Steps site.



Conger Alley

Wonder what we might find here? Heading just a couple of minutes south down the road from Twin Piers along the west side of Loch Long you eventually come to my favourite site in the loch. Blink here and you could miss the entry.

I did mention the road as being a potential hazard at Twin Piers, but at Conger Alley you really do need to be careful. Parking for the dive-site is on the side of the road opposite the loch in what can only be described as a small muddy lay-by. There is only really enough room for three cars at a push.

On the way to the site you'll have passed a bigger, "proper" lay-by that could be used instead – parking there does involve a longer walk back to the site but it could be worth it.

Crossing the busy road requires care, so I suggest carrying your kit down to the beach and getting kitted up there as opposed to by the car, and crossing the road with your hood etc in place.

The beach offers some strategically placed rocks on which gear can be propped, and even a very handy seawall that helps you "step into" a twin-set.

As with all the sites I've discussed the entry is really easy. Simply walk into the water, drop down and follow the slope to 12-15m before finning left for around four minutes. You eventually come to the edge of a large rocky reef, and from there it's up to you how deep you want to go.

If your certification allows it I'd recommend dropping down the reef to around 26-30m and then slowly zig-zagging your way back up it, taking your time to look in all the cracks and crevices.

I don't think I've ever had a bad dive at Conger Alley, because the life on the reef is unbelievable!

Besides crabs, starfish and anemones there is every chance of finding some of the good number of congers and lobsters that lurk in the larger holes.

Take your time to search each one because these creatures can be a little shy, but they are there.

It's also common to find the odd octopus on the rocks, so look carefully.

There is an abundance of fish, from flatties to colourful wrasse. As at Twin Piers, gradually ascend the reef and, once you've reached the end, head back along the slope and you'll eventually reach the exit.

These four sites are probably the most popular and accessible for the vast majority of divers, but they provide a mere taster of what this 20-mile loch has to offer.

The other nine sites I mentioned are also accessible from shore, but if you have access to a boat, or can book onto a charter such as those offered by Wreckspeditions from Dunoon, there is potential to explore even more sites.

Being so close to Glasgow and situated next to Loch Lomond with all the amenities that area has to offer, it's easy enough to arrange overnight stays in campsites and lodges if coming from further afield.

Above: Shrimp at Finnart.

Below left: An assortment of crabs at Twin Piers.

Below right: Plumose anemone at 29 Steps.

Zig-zag up the reef and then, once it's time to return, retrace your finstrokes. Depending on the tide state, if you come up to around 6m and swim back along you can't fail to hit the pier-legs, which offer the chance for a pleasant final exploration of the site on the safety-stop.

On a nice day with the sun breaking through the water the piers can look spectacular. The legs are awash with colourful life including starfish and anemones, and nudibranchs can be spotted if you look closely enough.

Other Loch Long shore-dives: An Caol-Easan Point, Craggen, Fisherman's Carpark, Glen Douglas Road End, Midway, The Caves, Torpedo Post, Torpedo Station and Torpedoes.

Gas fills: Aquatron (Glasgow); K-Dive (Coatbridge); West Coast Diving (Knockentiber, Ayrshire).

Post-dive refreshments: Ben Arthur Both (Arrochar); Green Kettle Inn B&B (Garelochead); Three Villages Café (*aka* the Pit Stop, Arrochar)

Worldwide conducts small-group trio

Dive Worldwide has introduced three group trips, each to a small resort where it's hoped that the 6-10 guests will enjoy on land the type of bonding usually associated with liveaboards.

All three trip prices include seven-night's full-board accommodation (two sharing) and transfers.

For the "Dive & Detox Maldives" trips you stay at the Boutique Beach Resort on Dhigurah Island at the tip of South Ari Atoll. It has only six rooms, and has won awards for sustainability and its work with the local community.

Kudarah Thila is only 10 minutes from the resort, which is also close to renowned whale-shark hang-out Dhigurah Island. Prices start from £1675pp, with 17 dives and departures on 25 April or 2 October.

A trip to Sharm el Sheikh in Egypt offers three Red Sea boat-dives a day, visits to Ras Mohammed, an early-morning dive in Tiran, the *Dunraven* wreck and two night dives.

Accommodation is at Sharks Bay Umbi Village resort. The trip costs from £645pp, including 15 dives and barbecue, leaving on 6 May or 10 June.

Finally, as Indonesia's Bunaken National Park celebrates its 30th anniversary you can spend a week on its edge at the Tasik Ria resort, with access to 50 of the park's dive-sites.

The itinerary also includes a dawn and a night dive – and a muck-diving trip to Lembeh Strait. You pay from £1345pp, with 17 dives and transfers, leaving 1 May or 4 September.

▸▸ diveworldwide.com

STEVE WEINMAN

DOUBLE-BUBBLE IN THE PHILIPPINES

Ultimate Diving says it has been busy working on Philippines itineraries for 2021 and has two extended double-header offers at popular locations.

One is for the Atlantis Resorts, combining the two into a single holiday, and the other is a comparable deal at the Magic Resorts.

Prices are similar in both cases. Book 13 Atlantis nights from £2869pp, with flights from London, transfers, six nights' half-board at both the Atlantis Puerto Galera and Atlantis Dumaguete (two sharing), and one night in Manila, and 30 dives pp.

If you opt for Magic Island in Moalboal and Magic Oceans in Bohol, the offer starts from £2799 for seven nights' half-board at each resort plus 20 dives. Single supplements apply.

▸▸ ultimatediving.co.uk

Blue deal

Blue O Two is offering 30% off sailings on the *Galapagos Master* liveaboard in March for those able to travel then.

The vessel is spacious but takes only 16 guests on the seven-night trips leaving San Cristobal on 1, 8 and 15 March. You pay £3364pp rather than £4804.

There is also a 10-night "Master The Galapagos" trip leaving on 22 March, from £4276.

▸▸ blueotwo.com

UNEASYJET

Many divers have used easyJet for short-haul trips in the past, enjoying the ability to carry on regulators, cameras and other kit at no extra cost, but the airline has now altered its policy "to help improve punctuality and give certainty to customers".

From 10 February you can bring aboard only a small cabin bag (up to 45 x 36 x 20cm) that will fit under the seat in front.

Only passengers who pay extra for "Flexi", upfront or extra-legroom seats can also carry on usefully sized cabin bags (up to 56 x 45 x 25 cm) to stow in the overhead lockers. What a pity!

▸▸ easyjet.com

HEADING OUT

Normally it can be difficult to secure a liveaboard slot to dive the celebrated and biodiverse reefs of Tubbataha in the Philippines, but this year Atlantis Dive Resorts says it still has open slots on its *Azores* liveaboard.

The sailings are on 17 April and 8 and 29 May and the price is US $4595, excluding flights, transfers, nitrox and marine-park fees. Atlantis promises a "worry-free" booking policy.

▸▸ atlantishotel.com

TRAVEL CORRIDORS

Following identification of new coronavirus mutations and the imposition of lockdown in most parts of the UK, international travel in the short-term has become increasingly restricted by domestic regulations.

Few diving destinations currently permit entry from the UK without considerable complication, and those that do might restrict movement further, or bring in new testing or quarantine rules with little warning.

Those able to travel (for essential work, for example) should be prepared to stay away for longer than planned. You must also provide journey and contact details and check self-isolation requirements.

Check the latest information at gov.uk. Diving destinations remaining open to UK visitors as of 7 January included:

Barbados
Bermuda
British Virgin Islands
Cuba
Dominica
Maldives
St Lucia
St Vincent & the Grenadines
Turks & Caicos Islands

Barefoot Luxury in the Heart of Bunaken National Marine Park

Síladen
Resort & Spa

Indonesía

www.síladen.com

BREATH CONTROL

ANDREY BIZYUKIN

SIMON PRIDMORE offers seven-part assistance to those in pursuit of that most elusive of diving holy grails – making your air last longer. This technique feature first appeared in June 2016

NO MATTER HOW experienced you are, or what sort of shape or size you are, you can always get more out of your diving by reducing the rate at which you consume your air.

The techniques in this month's column will not only help you enjoy longer dives, they will also ensure that you dive with less stress. As a bonus, they will make you look even better in the water than you do now – more relaxed, more comfortable and more professional.

If that is not enough, you will also find that you are much more aware of what is going on around you, and become better at spotting marine life.

1: GET IN THE MOOD

Spend a little time preparing yourself mentally. Find a quiet space where you can be alone and focus on the dive ahead.

Slow your heartbeat, establish a deep breathing rhythm, close your eyes or gaze out on to the ocean. Get yourself into a nice peaceful zone.

Put away any thoughts circling around your mind concerning other aspects of your life, particularly areas where there is something negative going on.

You're going diving; there is nothing you can do about anything that is happening in your surface existence while you are under water.

2: PAUSE ON DESCENT

We all learn the pre-dive safety check during our beginners' course, and this soon becomes something instinctive. Another very good habit is to do an in-water check at the start of your dive.

The whole process of gearing up on a busy boat and entering the water can be rushed and stressful, and can raise your breathing rate. Once you have left the surface and are a couple of metres under water, surrounded by the peace and quiet of the ocean, pause on your descent.

Take a few seconds to compose yourself, relax and get a long, slow, deep breathing cycle going (*see below*) before setting off calmly for the depths.

This is also a good opportunity to make sure that all your equipment is intact, buckles are fastened, nothing is leaking and your gauges are working.

3: LEARN TO EXECUTE THE PERFECT DIVING BREATH

The most effective way for a diver to breathe is from the diaphragm, rather than the chest. When you inhale, push your stomach out so that your lungs can expand, and so that you can draw as much air in as possible.

Ideally, take 5 to 7 seconds to breathe

Above: Horizontal and fins up in a modified flutter-kick.

Left: Relax! A stressed diver uses far more air.

in. The air in your cylinder is to be sipped like wine, not guzzled like beer.

When you exhale, compress your stomach muscles to reduce your lung volume to a minimum and breathe out for at least 7sec. This will give you a breathing cycle of around 15 seconds, and a rate of about four breaths per minute.

This extended exhalation will ensure that you expel from your lungs as much as possible of the carbon dioxide that your body generates via the metabolic process. A build-up of CO_2 will cause you to breathe faster and become anxious.

Make this long, deep, slow breathing cycle an instinctive part of your diving behaviour. You will use less air, but also be able to stay calm, think clearly and control your breathing even if something goes wrong, or a current picks up.

Breathing from the diaphragm does take a little practice, but you will be impressed at how calm it makes you feel.

It's something you can practise any time, anywhere, while you're riding on a bus, sitting in your car in a traffic jam or watching TV.

At home, a good exercise is to lie on the floor, put a dive-weight on your stomach and focus on moving it up and down by breathing in and out. Try not to move your chest during the breathing cycle.

4: GET FIT

Diving is a sport for almost everyone but it is still a sport, and the fitter you are the better you will dive and the less air you will use.

Start a programme of progressive aerobic training and increase the level of your training as a dive-trip approaches.

This will enhance your stamina and help you keep a slow, steady breathing rate even when you are expending effort.

5: DON'T FLIP & FLAP

When you're under water, move only when you need to go somewhere. If you aren't going anywhere, stay still.

After all, as you sit here now, reading this magazine, you're unlikely to be moving your feet or flapping your arms around. The more you move, the more air you will use.

Your arms are primarily for communicating or holding lights and cameras. They are no use at all in the medium of water for regaining balance, maintaining buoyancy or changing direction.

Keeping your arms close to your body helps you move more smoothly through the water as it makes you more streamlined. This in turn makes it easier to swim against a current. The less effort you exert, the less air you will use up.

If you want to change direction, dip your shoulder as if you're riding a motorbike and use your fins like the rudder on a boat.

If you lose your balance, go with the flow at first and let yourself move with the water column. Then adjust your body position by shifting your shoulders and torso to regain your equilibrium and use breath control to make yourself more or less buoyant.

In the water, concentrate especially on what your fins are doing. Experienced guides and instructors know that the degree of divers' mental agitation is reflected in the movement of their feet, especially when at the surface.

Much of this movement is completely unconscious but, of course, the more you flap your fins, the more energy you use and the more air you consume.

6: LOSE THAT WEIGHT

There is a good chance that you might be wearing too much weight when you dive. If you're still wearing the same amount as you used in your basic training, this is almost certainly the case.

Another good indication is if, when you swim under water, you adopt the head-up tail-down posture of a seahorse.

If you're not sure, ask someone to take video of you during a dive. You may not be as perfectly horizontal as you thought.

This affects your air consumption adversely in several ways. It means that you need to inflate your BC too much.

Being over-weighted and compensating by air injection makes it harder for you to maintain your balance under water. The excess air moves around in your BC every time you change your position.

Constantly struggling to adjust your position will cause you to get agitated and lose control of your breathing.

Finally, it takes more energy to move through the water if you're not horizontal and streamlined. So trim your weight down to the minimum. As a basic rule of thumb, you should be able to hang comfortably at 5m with 50 bar in your cylinder and no air in your BC.

Wear your weight-belt higher on your waist to bring your feet up and make you more horizontal. Remember to tighten your belt as you descend – it tends to loosen and slip down when the neoprene of your wetsuit is crushed at depth.

Above: The process of gearing up and getting in can be stressful.

Below: This is where breath conservation is needed.

Read more from Simon Pridmore in:

Scuba Confidential – An Insider's Guide to Becoming a Better Diver

Scuba Professional – Insights into Sport Diver Training & Operations

Scuba Fundamental – Start Diving the Right Way

Scuba Physiological – Think You Know All About Scuba Medicine? Think Again!

Scuba Exceptional – Become the Best Diver You Can Be

All are available on Amazon in a variety of formats.

ANDREY BIZYUKIN

7: LEARN DIFFERENT KICKS

There are a number of different ways of finning other than the classic wide full-legged flutter power-kick that divers are typically taught when they first learn to dive. Before your next trip, go to the beach or pool and practise doing the kind of frog-kicks a breaststroke swimmer uses, or a modified flutter-kick with knees bent and feet up.

You will find that these take less energy and can be maintained for a long time with little effort. As well as improving your air consumption, different methods of propulsion can minimise the disruption you cause to the environment through which you're swimming.

Practise with a buddy, because you will need an extra pair of eyes to see what your fins are doing behind you.

Get advice from a local instructor or, during your trips, watch closely how your dive-guides swim, and copy them.

CORON IN COMFORT

You can get your fill of big World War Two wrecks from the Philippines getaway island of Sangat, says BRANDI MUELLER, reporting coffee in hand from her go-to hammock

Pictured: Engine-room gauges on Brandi's favourite Coron wreck, the *Akitsushima*.

AT 5.50AM ON 24 SEPTEMBER, 1944, 96 Grumman F6F Hellcat fighters and 24 Curtis SB2C Helldiver bombers lifted off from aircraft-carriers for what would be the longest-range air attack launched to date.

Their destination was Coron Bay, 340 miles away. Twelve ships from a Japanese supply fleet were thought to have found an unknown and safe anchorage there.

The ships had come from Manila Bay, some 170 nautical miles away, on 23 September. Manila Bay was under attack and at least 15 ships had been sunk by US air-strikes since 21 September.

Hoping to save the rest, the Japanese had been moving them to other locations thought to be out of range of US naval aircraft and land-based bombers. They thought the ships in Coron Bay had arrived secretly – they were wrong.

The US Third Fleet was commanded by Admiral William F "Bull" Halsey aboard the battleship USS *New Jersey*.

He designed a mission that was approved by Task Force 38's commander Vice-Admiral Mac A Mitscher on the USS *Lexington* aircraft-carrier.

How the Americans discovered the fleet in Coron Bay is unknown but whether spotted by aerial photo reconnaissance or intercepted Japanese radio transmissions, the ships were subject to a surprise air attack.

The plan relied on a quick strike. At that distance, the crews knew they had only minutes to strike before they would have to head back to their carriers.

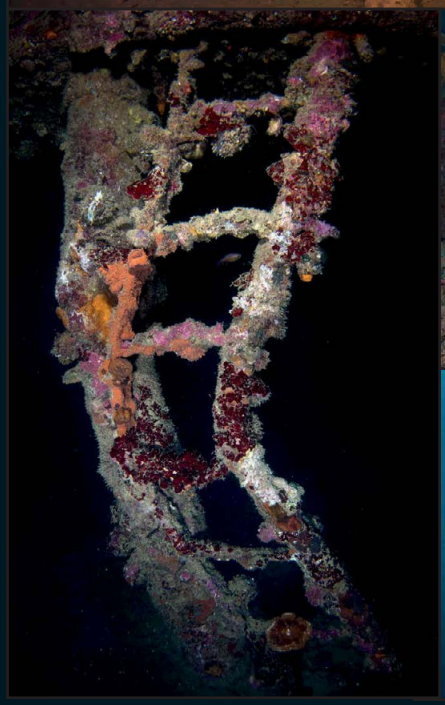
The planes arrived at 9am to find the 12 ships in the bay. Within minutes they were heading back, leaving every ship sinking or burning behind them. Every plane returned safely and only one vessel, the *Kamoi*, was reported to have escaped.

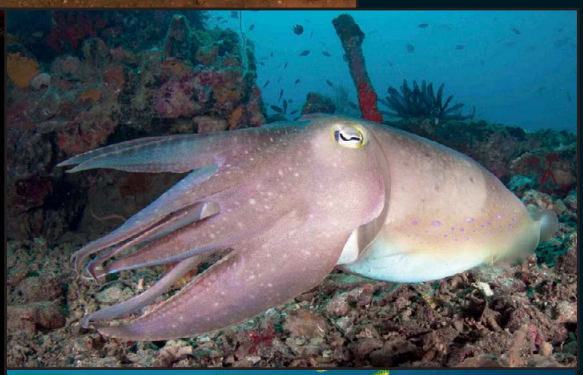
IN THIS BEAUTIFUL part of the Philippines, 76 years have passed. Part of WW2 history has been preserved beneath the waves, and the wrecks have provided a new home for marine life.

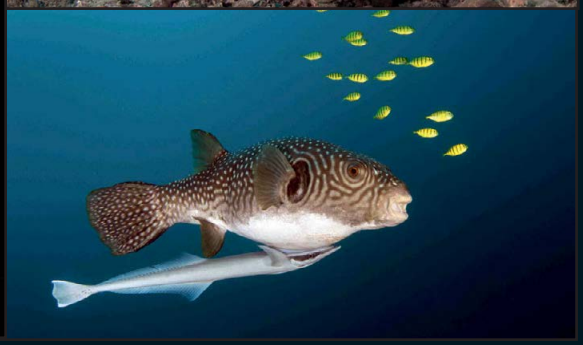
The *Okikawa Maru* is a great wreck for divers to start on. The upright oil-tanker is 170m long and depths range from 10-26m, making it easy to spend a lot of time exploring the ship. Those divers with appropriate experience can access the interior through the propeller-shaft.

I followed my guide into the small, dark circle, turning on my lights as we entered the darkness. He took me on a tour through the length of the ship, through large compartments and holds before emerging at the bow.

There was little current, but they do occur in the area and can stir up the silt even within the ship. Such movement had left particles suspended in the water, and the ambient light streaming in from







Left: A diver inside the *Okikawa Maru*.

Below, clockwise from left: 'Melting' ladder on the *Okikawa Maru*; on the same wreck, a cuttlefish; and a pufferfish, remora and juvenile golden trevally on the mooring.

outside (and from our lights) illuminated them and cast an eerie haze throughout the ship.

At the bow we turned and swam along the exterior towards the stern. Branching black-coral bushes, colourful soft corals and sponges covered every inch of the ship, and fish were everywhere.

A baby turtle swam past, and I stopped to take photos of several anemones.

Another excellent upright wreck is the *Olympia Maru*, a 122m freighter with a depth of 18m on the deck to a maximum of 32m. Starting at the stern, my guide swam into an open hatch on the deck.

Finning into the space directly below, I could see light coming in ahead of us, but also noticed that there wasn't much height in the area.

Looking around, I saw ladders and structural beams bending like something out of a Salvador Dali painting (instead of melting clocks, think melting ladders).

We continued forward, entering a massive cargo hold that opened up above us. In the shadowy areas were schools of cardinalfish and other small silver fish that glittered in my light.

Making our way in and out of cargo holds, we passed schools of goatfish and fusiliers and, at the bow, a large cuttlefish flashed different colours from pink and red to dark brown and then bright white.

There are still disagreements as to which ship is which, and trying to confirm the name of the one you're diving is tricky because reference materials differ.

For instance, the *Olympia Maru* used to be called the *Tangat*. I have tried to find the most recent identifications but further confusion comes from ships renamed over time.

Clockwise from right: Scenes from the *Ekkai Maru* – marine growth; a diver in the wreck; fire-bricks; fish.

WHAT WAS MOST recently named the *Ekkai Maru* had been the *Morazan* and the *Manco* before that. To make this wreck even more confusing, she was probably incorrectly called the *Olympia* for a long time.

She had been built in the UK in 1908 (as *Manco*), then sold to Central America in 1921 and renamed *Morazan*. In 1941 she was captured by the Japanese and used as a cargo vessel designated *Ekkai*.

Whatever you to call it, this 100m wreck is a great dive. It sits on its starboard side ranging from 14-26m.

The engines were salvaged, but two massive boilers remain for divers to swim between. In the same area are fire-bricks stamped with the British names of the makers and piles of coal.

Again, partly due to salvaging, there are lots of easy swim-throughs. The companionways make for a great tour, too, with lots of light from what had been windows and many entry/exit-points.

My favourite wreck was the *Akitsushima*. Many of the WW2 Japanese wrecks we dive have the designation *Maru*, meaning merchant ship, and merchant ships of all types were requisitioned into the Japanese Imperial Navy during the war, but those without the *Maru* were built for the Navy.

The *Akitsushima* was one example, built as a tender for the Kawanishi H8K "Emily" seaplane, which had a 38m wingspan and weighed 24.5 tonnes.

It had a massive crane to support this weight, and it lies in the sand at around 36m. You can swim out over it to get a feel for its size.

Above: Diver over the crane on the *Akitsushima*.

Right, clockwise from top left: Scenes on the *Kogyo Maru* – rolled-up mesh for airport runways in the hold; the galley; turtle; cement bags.

Below from top: Inside the *Iraku Maru;* a diver takes in the view from outside the same wreck.

I was excited to dive this wreck because the *Akitsushima* had been in Truk Lagoon when Operation Hailstone began, and managed to escape. It also had a nice engine-room, accessed by finning past the gigantic winch that operated the crane.

There is also a very photogenic gauge panel. My guide pointed out a few hidden artefacts, including a flight helmet and an anti-aircraft gun.

Each of these big shipwrecks has so much to see that you can spend multiple dives on each one. Other interesting examples in the bay include the *Irako Maru*, a 147m refrigerated provisioning ship that could supply food for 25,000 personnel for up to two weeks.

The *Kogyo Maru* sits on its port side from 24-34m, and inside the cargo holds there is a bulldozer, tractor, bags of cement and coils of rolled-up mesh wire, probably used in airport runway construction. Inside the galley you can see massive rice-cookers and stoves.

There are several small wrecks in the area as well, including a 35m sub-chaser right next to Sangat island in depths ranging from 3-18m. The wreck was covered in coral and marine life and there was a reef beside it that made a good spot to watch mandarinfish mate at twilight, and a good night-dive.

Most of the interior of the ship was open and easy to swim through.

Close by is a 30m gunboat, also resting on a shallow reef. Only the structure is left, but the marine life is prolific.

Schools of reef fish have settled into the wreck, and I found damselfish-guarded eggs, butterflyfish swirling around in pairs, and anemones with clownfish dotting the wreck.

Nudibranchs and flatworms could be found in the coral growing on the hull.

I find it difficult to imagine the destruction that occurred in places such as Coron, which today has screensaver-perfect views and paradisiacal vibes.

I was exploring the wrecks from Sangat Island Dive Resort, staying in a beach-front chalet on stilts with a view so good it was tough to leave my deck... even to go diving. Even more difficult to leave was the hammock that stretched out under the raised chalet.

With the perfect amount of shade and ocean breeze, I was gently rocked to sleep during most of my surface intervals.

Usually my only interruption was my alarm to go diving again, or the chatter of the macaque monkeys who, in my opinion, own the island.

IN THE MORNING *cafetière* coffee was available, and I would usually bring a pot to my deck to enjoy the calming sounds of jungle and ocean before breakfast. Meals were served in an open-air restaurant with both local and Western-style cuisine.

Walking down a pier from the restaurant takes you to another small island with a bar and stairs to climb to an overlook point (drinks in hand) to watch the sunset.

The dive-shop was just a few more steps past the restaurant, as were the boats, making it easy to walk over to analyse nitrox tanks and set up gear before breakfast.

By the time I was done, my kit was loaded into the boat and we were ready to go. Most of the wrecks were just a few minutes from the resort, so we'd spend surface intervals back at Sangat (you could find me in my hammock).

The resort also takes special care of its incredible environment and exists off the grid. Solar panels cover the roofs of the pier and other buildings, the resort makes its own water, and the chalets and buildings are made using traditional methods and sustainable materials such as hand-woven bamboo, cogon grass and nipa palm.

After my trip I have been asked how the Coron wrecks compare to those of Truk Lagoon, Bikini Atoll or Palau.

Like diving everywhere, it's all good, just different. Unfortunately, the wrecks of Coron have been extensively salvaged, so you won't find artefacts inside as you might in Truk Lagoon, but there are some, and my guides talked about occasionally finding new stuff.

Some of the large interior elements have been salvaged as well – engines, propellers and large pieces of machinery. Sometimes I liked this; it made for big and open swim-throughs that went on forever within the ship.

The depths of the Coron wrecks are manageable for a recreational diver. A few can take a diver to 40m, but after a few minutes looking at a propeller in the sand, one has usually seen everything at that depth and can move shallower.

Most are above 30m, and I rarely found myself close to no-deco time.

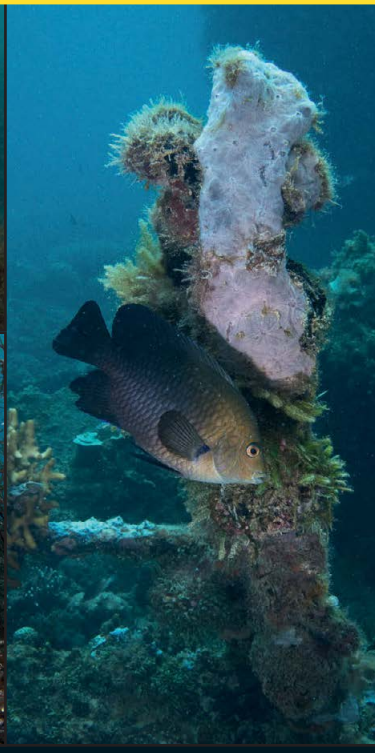
There are different profiles for different diving experience levels, so anyone can dive the wrecks. Just be aware of your own training and personal limits, be it depth, deco time or wreck-penetration, and don't go beyond them.

The marine life on the wrecks was fantastic. Being in the Coral Triangle they are covered with many species of coral, sponge and marine life.

Many nudibranchs and flatworm species could be found crawling on the hulls. It could be tough to find them within all the coral that has grown on the wrecks, turning them into artificial reefs.

I really enjoyed diving the wrecks of Coron, a nice mix of WW2 ships with exciting interior routes to explore as well as fantastic marine life on the outside.

Plus, topside was beautiful and I could see myself returning to Sangat both for the slow, relaxing pace of the island and the exciting wreck-diving.



Above, clockwise from top left: Scenes from the gunboat – the bow; damselfish guarding eggs; lionfish; anemonefish.

Below, from left: Sangat island; Brandi's chalet view.

FACTFILE

GETTING THERE ▸▸ Brandi flew into Manila, caught a domestic flight to Busuanga and a short car-ride and boat-ride brought her to Sangat.

DIVING & ACCOMMODATION ▸▸ Sangat Island Dive Resort has oceanfront and hillside chalets, sangat.com.ph

WHEN TO GO ▸▸ Dry season from December to June offers the best visibility.

MONEY ▸▸ Philippine peso. Credit cards commonly accepted but with fees. No ATM on Sangat, nearest is at airport.

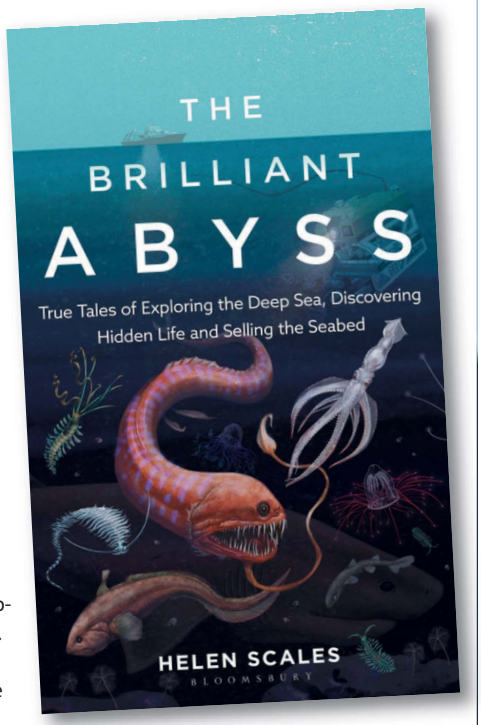
PRICES ▸▸ All-inclusive room £220 per night (two sharing). £34pp per dive.

VISITOR INFORMATION ▸▸ itsmorefuninthephilippines.co.uk

THE HIDDEN THREAT

The Brilliant Abyss, True Tales of Exploring the Deep Sea, Discovering Hidden Life & Selling the Seabed

by Helen Scales



HELEN SCALES is fast becoming one of my favourite diver-authors, but as you get deeper into her latest book you find that there is a lot more to it than is immediately apparent.

It has a long subtitle but it's the "*Selling the Seabed*" bit that's the stinger.

The first half is a mouth-watering journey through those parts of the ocean that scuba-divers don't get to see first-hand – the deep-trench seabeds, the black and white smoker geothermal vents, the deep-lying seamounts and so on.

If you haven't read any of this author's work before you might think that trying to describe the spectacularly visual life-forms of the abyss without benefit of illustration is going into battle with one arm tied behind your back.

The challenge doesn't seem to faze Scales, however, because she has the skill, like a sub-aquatic Bill Bryson, to conjure up word-pictures with little apparent effort. Her descriptions are so graphic that you find yourself just taking pleasure in the writing.

I first appreciated how this marine biologist could bring a subject alive in *Eye of the Shoal: A Fishwatcher's Guide to Life, the Oceans and Everything*, one of my favourite dive-related books from a few years ago.

I haven't read her earlier titles on molluscs and seahorses (there are too many new books to keep up with) but I'm sure I'd enjoy them too. She can often be heard on BBC radio too.

The Brilliant Abyss is really less about weird creatures than the importance of the deep ocean to the planet's well-being, especially as a biological carbon pump and source of antidotes to the illnesses that plague humanity.

And just as you're marvelling at Scales' ability to make science not only accessible but enjoyable, she takes a sudden turn into politics and the sinister threats to the deeps.

If like me you were only vaguely aware of the practical realities of the deep ocean as a rubbish dump and a target for potentially catastrophic fishing and mining activities, it will all jump into frighteningly sharp focus.

You'll be outraged to read about the two-faced organisations charged with safeguarding the deep seas while equally thirsting to exploit them.

The book is sparing on the preaching, thankfully, but then it's hardly needed – the alternative futures are laid out for us all too clearly.

As a British reader I wished this book used metric measurements so that I wouldn't have to keep mentally converting depths into more familiar metres (or km). Perhaps that was done with the US market in mind.

No matter, I reckon this is not only an enjoyable and informative but an important piece of work.

I hope a whole lot of people get to read it, including divers but especially all those in a position to shape a positive future for the deep ocean.

Bloomsbury Sigma
ISBN 9781472966865
Hardback, 352pp, 14x22cm, £16.99
(also an eBook and audiobook)

TOP 10 BEST-SELLING SCUBA-DIVING BOOKS

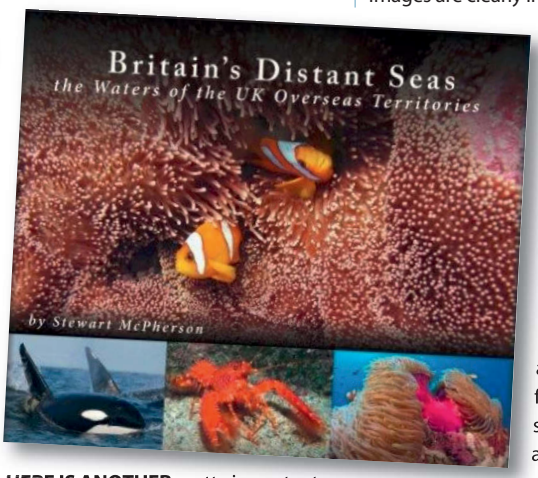
as listed by amazon.co.uk (18 December, 2020)

1. **100 Dives of a Lifetime: World's Ultimate Underwater Destinations,** by Carrie Miller & Brian Skerry
2. **Fifty Places to Dive Before You Die,** by Chris Santella
3. **Diving the Thistlegorm,** by Simon Brown, Jon Henderson, Alex Mustard & Mike Postons
4. **Wild and Temperate Seas: 50 Favourite UK Dives,** by Will Appleyard
5. **Scuba Diving Hand Signals: Pocket Companion for Recreational Scuba Divers,** by Lars Behnke
6. **Reef Life: An Underwater Memoir,** by Callum Roberts
7. **Sharm el Sheikh: Diving Guide and Integrated Logbook,** by Rik Vercoe
8. **Dive Truk Lagoon: The Japanese WWII Pacific Shipwrecks,** by Rod Macdonald
9. **Shark Bytes: Tales of Diving with the Bizarre and the Beautiful,** by John Bantin
10. **Fishes of the Maldives, Indian Ocean,** by Rudie H Kuiter

WILLING HANDS ACROSS THE SEA

Britain's Distant Seas: The Waters of the Overseas Territories

by Stewart McPherson



HERE IS ANOTHER pretty important book, and respect is due to scuba-diver and naturalist Stewart McPherson, because what he has accomplished here is impressive.

Much as we might have mixed feelings about Britain's colonial past, the country still claims to rule – and be responsible for – numerous waves all over the world. Its overseas territories cover well over 2 million square miles and extend into each of the seven seas, making it the world's fifth-largest "ocean estate".

Importantly, as McPherson explains, this estate embraces every major aquatic ecosystem on Earth.

So he set out to offer an overview, the result being this attractive coffee-table catalogue of biodiverse and often barely explored habitats.

There are chapters for each of the territories. Most are the very definition of remote: Ascension, the Falklands, Pitcairn (the only Pacific territory), St Helena, South Georgia, Tristan da Cunha and the British Antarctic and British Indian Ocean Territories.

Others count among more familiar diving locations: Bermuda, BVI, the Cayman Islands, TCI and, closer to home, Gibraltar and bits of Cyprus.

Attractive hand-drawn maps head each chapter, and there are some 600 topside and underwater photographs.

The text has been contributed by more than 100 marine biologists, conservationists and other resident and expeditionary experts.

The writing is unexcitingly factual – this is really a reference book – and covers aspects beside the underwater world. Quality of the topside photos is good, while the underwater ones are generally good if a tad variable.

I include my own all-too-modest contributions in the variable category, my feeble excuse being that they were taken at the tail-end of a tropical storm. Though not remote, few divers visit Montserrat, so underwater images are clearly in short supply!

There's a DVD to accompany the book, featuring a half-hour film and shorts on the various wildlife groups.

It's very much a sampler, with content based on best-available diverse footage, but sequences such as the grouper mass-spawning in the Caymans are worth seeing.

McPherson, who also narrates the DVD, at one time visited all 16 territories over a three-year period to produce his televised documentary *Britain's Treasure Islands*.

This latest venture has been quite a logistical triumph. I know that he led a team working solidly for many weeks at the end of 2020 to pack and dispatch copies of the book and DVD to 20,000 schools across the UK and all the overseas territories.

He did this as part of the "2020 Hanson Box" project of the Don Hanson Charitable Foundation to make the resource available to 7.5 million children. Cause for applause.

I hope the schools can make good use of the book and DVD, because McPherson is on a mission to inform.

His subject might be concealed by its disparity, remoteness and the fact that it's submerged, but he succeeds

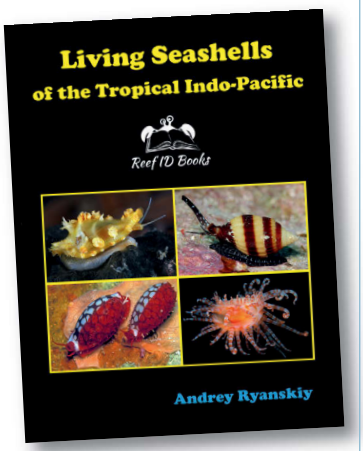
in bringing it into sharp focus here.

A big, well-produced book like this would often cost three or four times as much, so it's great value at the price.

Redfern Natural History
ISBN: 9781913631017
Hardback, 200pp, 25x30cm, £14.99 (complementary DVD, £9.99)

SHELL GAME

Living Shells of the Tropical Indo-Pacific
by Andrey Ryanskiy



"Probably this is my most important work," yet another naturalist-diver, Andrey Ryanskiy, tells me. "I was lucky to receive *huge* support from the best photographers and scientists in this field, which allowed me to publish a unique book – I am sure that at least two-thirds of the species here have never before been featured in natural conditions, only as dead, dry shells."

We have reviewed Ryanskiy's Reef ID Books series before – most recently *Nudibranchs of the Coral Triangle* in 2019 – and his style is strictly no-frills reference but thoroughly researched and illustrated to a high standard.

Covering more than 1500 species, this new guide covers molluscs found from the Red Sea to East Africa, Hawaii, the Marshall Islands and Guam.

You'll find all the gastropods – sea-snails, including hundreds of cowries, conchs and so on – bivalves such as scallops and clams, and the primaeval-looking chitons.

"This is the only book where you can see photos of all recognised species of giant clams and know how to tell them apart," says Ryanskiy.

To be honest, it wouldn't even have occurred to me to try. The biggest clam in the book, *Tridacna gigas*, can grow to 137cm.

At the other end of the scale, this is apparently the first guide to feature micro-molluscs, the smallest being *Caecum cf modestum* at 1.7mm. "I was lucky to take a picture of this strange, tiny animal in Bali," he told me.

Leafing through the many pages, I was very surprised by the variety and flamboyance of so many of these molluscs, which could rival the showiest nudibranch for attention.

The moon snails, tritons, the extravagantly visual rock shells or some of the often-deadly cone shells are examples, and the many egg shells featured have markings that would inspire any photographer.

Some, like the great egg shell, actually mimic nudibranchs. And, though more seasnot-like, I did feel I wanted to learn more about the dismissively named trivia shells!

The quality of these massed banks of reference shots is indeed high – and I can see why principal photographers Scott and Jeanette Johnson and the others are drawn to this branch of macro. Those two each have sea snails named after them, while *Nassarius massemini* was named after another of the photographers, David Massemini, as recently as 2020.

I should point out that the high price of this fascinating paperback reflects the fact that it's printed to order – you'll find discounted versions at gumroad.com, or else go digital.

Reef ID Books
ISBN: 9785604204993
Softback, 266pp, 16x23cm, £35.98
Also available on Kindle, £18.99

Reviews by Steve Weinman

TOP 10 MOST WISHED-FOR SCUBA-DIVING BOOKS

as listed by amazon.co.uk (18 December, 2020)

1. **Diving the Thistlegorm,** by Simon Brown, Jon Henderson, Alex Mustard & Mike Postons
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3. **Wild and Temperate Seas: 50 Favourite UK Dives,** by Will Appleyard
4. **Deco for Divers: A Diver's Guide to Decompression Theory and Physiology,** by Mark Powell
5. **Reef Life: An Underwater Memoir,** by Callum Roberts
6. **The Third Dive: An Investigation Into the Death of Rob Stewart,** by Robert Osborne
7. **Photo Guide to Fishes of the Maldives,** by Rudie H Kuiter
8. **Neutral Buoyancy: Adventures in a Liquid World Paperback,** by Tim Ecott
9. **Essentials of Sea Survival,** by Frank Golden & Michael Tipton
10. **Manual Of Freediving: Underwater On A Single Breath,** by Umberto Pelizzari

WELL AND TRULY TESTED

It's getting on for half the price, so should we expect Zeagle's new flagship regulator to find itself in the shadow of that of stablemate Atomic? STEVE WARREN works hard to provide the answer – and also checks out a tricky snorkel and, yes, a gauge console

REGULATOR
ZEAGLE F8

ZEAGLE, A US BRAND THAT'S BEEN around since 1979, has always flown a little under the radar in the UK. It originated as a manufacturer of sky-diving equipment in Zephyhills, Florida – a state in which cave-diving is, of course, a popular scuba pursuit.

Zeagle was at the forefront and arguably ahead of its time in developing the contemporary weight-integrated wing.

Today it is still run as a family business, though it is owned by the Huish Outdoor group of companies.

Huish has been busy acquiring diving manufacturers, including Oceanic, Bare and Atomic Aquatics. Zeagle offers a relatively small product line, and I get the impression that's the way Zeagle likes it.

The manufacturer isn't shy about saying that it worked with Atomic on developing its flagship F8 regulator.

Coming partly from the photographic industry, I know it's common practice for some camera brands to team up with lens companies known for incredible optics, such as Leica or Zeiss. Competitors co-operating might seem odd but it can pay off for both parties and the consumer when done right.

The camera company basks in the prestige of its alliance and, naturally, charges a premium for owning those marque lenses, while the end-user gets a "best of breed" piece of glass, albeit at a commensurate price.

But it's unusual in diving, although a fair amount of badge-engineering does occur, especially with computers.

Atomic has a stellar reputation so Zeagle gains by associating with it, but does this put the F8 in Atomic's shadow? We'll get to that.

The F8 is EN250A-rated, so it meets the EU standard for a single diver breathing moderately hard at 50m or two breathing simultaneously using an octopus just as hard at 30m. It is also rated for use at water temperatures as low as 4°C.

This is the highest EN rating for a regulator. It's pass or fail and does not seek to test the limits at which the regulator might flunk by increasing the respiration rate or taking it deeper, or further cooling it until it ices.

Zeagle's own figures indicate that ease of breathing for a single diver easily exceeds EN250A at 60m. This underscores that the standard informs the consumer only that a regulator meets its requirements, not by how much it surpasses them.

First Stage

The first stage is a balanced-diaphragm design. Balanced first stages are largely unaffected by the pressure-drop in your tank as you breathe it down, so inhalation effort isn't impaired even when near-empty.

Diaphragm regulators have a push-rod on which the diaphragm bears down when you inhale. This opens the valve to send air to the second stage.

The push-rod is inside the air-filled first-stage casing and, in non-environmentally sealed models, the diaphragm flexes under water pressure to depress it.

On the wet side of the diaphragm, a spring sets the intermediate pressure. In an open or non-environmentally sealed diaphragm first stage, icing or silting can occur here.

This can block the spring, so the valve no longer opens or closes as it should.

The F8 is environmentally sealed. An air-filled flexible cover separates the main diaphragm and spring from the water. This completely protects the mechanism from external freezing, a concern for coldwater divers, and from dirt, sand and mud, an issue for divers working in rivers or harbours, for instance.

There are five fixed medium-pressure and two high-pressure ports, giving lots of options for hose-routeing. You can use the F8 with nitrox mixes up to 40% out of the box.

Second Stage

The second stage is pneumatically balanced, so inhalation effort should be minimised in terms of the regulator's mechanics. Second stages contain a spring that must be strong enough to hold back incoming air from the first stage. Without it the regulator would freeflow.

The problem for the designer is that the spring's strength is fixed, and is often stronger than it needs to be in shallower water.

This is because air pressure reaching the second stage increases the deeper you dive.

A pneumatically balanced second stage surrounds the spring with air. By varying its pressure, pneumatic balancing has the effect of strengthening the spring when needed.

This allows a weaker spring to be used and minimises


Rapid-adjustment knob and, above it, the venturi-control lever.

cracking effort – the initial and hardest part of taking a breath – regardless of depth.

The spring is part of the technology derived from Atomic. As I understand it, it's made from Super Alloy, which is more expensive than the usual stainless-steel but allows it to be stronger length for length. Fewer coils are needed and this again should mean that fewer eddies are caused by air passing through it, so air-flow to the diver is more efficient.

On the F8, cracking effort is diver-adjustable. Turning an external dial increases spring tension, making it harder to inhale. There's a distinct end-stop to the rotation of the dial.

In the manual Zeagle makes clear that this control should rarely be used, other than when getting in and out of surf or jumping from boats, when impact with the second-stage diaphragm might cause a freeflow.

I must also praise Zeagle for pointing out that detuning a regulator won't conserve air.

The harder you work to get it, the more you use.

A switch allows you to control the venturi and, again, Zeagle stresses that this is an anti-freeflow pre-dive/dive control. It should always be set to the dive position for diving.

This is an essential rule to follow with any adjustable regulator, but not everyone gets it.

The second stage is made of technopolymer. A steel heat-sink transfers cold from the second-stage valve to the warmer water, delaying super-cooling of the regulator. This helps to avoid icing problems when coldwater-diving.

A braided flexible hose makes it easy to coil up the regulator for packing. A thoughtful feature is that the hose-protector on the second stage easily slides back to expose the metal swivel for cleaning.

In Use

Setting up the F8 with accessories such as gauges and direct-feeds requires Imperial Allen keys to extract the ports.

The choice of five mp and two hp outlets makes it very easy to configure hoses according to your preference, even for single-tank divers running, say, four mp whips to account for primary and octopus second stages and direct feeds for both a BC and drysuit.

The DIN handwheel has a really good non-slip surface, so it's easy to do up or remove with cold, wet hands. There's a brief *phut* when you open your tank-valve. To save wear on the second-stage valve seat, when not pressurised, the valve lifts off it. I'm assured that this feature does not allow any leakage of water into the first stage when rinsing.

With the F8 second stage set for easiest inhalation, my first dive was a fairly easy-going one to visit a handful of scuttled vessels along Gibraltar's impressive wreck trail. I was using a computer that calculated my surface breathing rate and it was interesting to see this fluctuate with increases in finning effort.

I was breathing very lightly, and the F8 certainly lets you sip air. The cracking effort is extremely responsive and the air-flow silky smooth.

The second stage is very light on the jaw and the bite-tabs on the mouthpiece are soft.

Combine this with the flexi-hose and it all adds up to a regulator that's about as unnoticeable as it gets.

The purge is easy to use with or without gloves and the exhaust-T does a good job of keeping your field of view clear of bubbles.

Put this regulator in upside-down in a moment of confusion, as can happen in a less-than-textbook sharing scenario, and it clears completely with your first exhalation.

Octopus Test

Sharing brings us to the deepwater octopus test. The A in EN250A stands for "auxiliary". It confirms that a regulator has been proven to supply two divers breathing moderately hard at 30m from a single first stage simultaneously as easily as one diver breathing at 50m.

The mass of gas the regulator must supply within a given window of exertion, or work of breathing, is 500 litres per minute for the sharing part of the test and 375 lpm for one diver at 50m. Testing is done in a lab using a mechanical breathing machine, and effort is measured in joules.

Our confirmation test, if you like, is real-world and very unpleasant to do. It involves heading down to 30m, holding onto a wreck and finning like fury to get your breathing rate up. What my co-tester Robert Sheriff and I were trying to do was "beat the lung", essentially demanding more air than the regulator can deliver.

As your CO_2 levels soar, keeping up the pace becomes ever-harder. As a tester, you are trying to determine whether you're feeling out of breath because of the inevitable hypercapnia or because the regulator is restricting air-flow.

I was breathing from the F8 and felt that it was delivering as much air as I could demand – I didn't feel, despite air density at that depth, that it was holding back in any way.

Robert was on the octopus, a standard F8 second stage except for a yellow hose and accent on the casing for easy identification in an out-of-air situation. Robert, a member of Gibraltar SAC and instructor with a respectable level of technical training, also services many members' regulators, so it was interesting to hear him say: "That's a great valve."

Diving restrictions were in place in Gibraltar because of Covid so we couldn't dive as a big-enough team to dedicate someone to accurately monitoring our breathing rates, but on previous tests it does seem that we hit the EN250A litres per minute standard in short bursts.

On the Zeagle dive we tested three other regulators. One of those with which Robert also assisted me was a premium model from another brand but with a budget octopus.

The octopus, though EN250A-rated, fared less well on the test compared to the top-of-the-line F8 octopus. Food for thought.

Conclusion

The Zeagle F8 is most certainly *not* in Atomic Aquatics' shadow – not that of any other regulator manufacturer.

It's an extremely impressive performer. It breathes superbly under duress and add in environmental sealing, a practical port layout and light weight for travel and you have a winner. Highly recommended. ■

SPECS

PRICE ›› £540, octopus £190
WEIGHT ›› 1.18kg
PORTS ›› Five mp, two hp
FIRST STAGE ›› Balanced diaphragm
SECOND STAGE ›› Pneumatically balanced
CONTACT ›› zeagle.com

SNORKEL

SHERWOOD **TIGA SILICONE DRY**

SOME TRAINING AGENCIES INSIST THAT their divers should wear a snorkel on their mask-strap for scuba diving. It's a safety issue.

Out-of-air divers at the surface can struggle to keep their head high enough to breathe easily, especially in a chop. If badly trimmed, they might also find themselves forced onto their face, and can quickly tire trying to stay upright.

Or they might have to swim back to shore, and need to be able to keep their face in the water to pick their route through rocks.

A snorkel can therefore play a huge role in preventing surface drowning. So let's review Sherwood's Tiga Dry Snorkel primarily from the perspective of scuba-divers.

The main features are a dry top-valve, water reservoir and drain-valve at the bottom, dropaway flexible hose section and mouthguard mouthpiece.

In Use

I took the Tiga into some fairly rough water and can confirm that it is a very dry breathe. The waves were slopping against the dry top, and each time the tube dipped into the water the float-valve closed.

Now, in preventing any noticeable water entering the tube, the valve also stops any air getting through as well. This took a bit of getting used to.

My snorkelling began in the 1970s. I owned at least one snorkel with a dry valve but have little memory of it, probably because I kept losing snorkels and barely used it.

Besides, valved snorkels fell under suspicion on safety grounds, so I got accustomed to the classic models.

I'm still a keen snorkeller and don't use valved snorkels. Like dolphins, which I've seen splutter a couple of times, I've learned to cope with unexpected liquid in the breathing area.

The Tiga's air stoppage is momentary. You soon learn to raise your head a little to clear the water. The valve then falls open and you get air again.

The corrugated section allows the mouthpiece to fall clear of your mouth and loll to one side, to prevent it tangling with your second stage while under water.

There is an argument for this approach, because a rigid mouthpiece can get in the way of replacing your regulator if you lose it, or need to receive an alternative air source. If the hose snags on the snorkel mouthpiece, it can displace your mask and double your troubles.

So the Tiga works very well indeed at keeping water out of your mouth. It's also very comfortable.

But, and this took me completely by surprise, when you use it for freediving it literally sucks. I found that even dropping a metre gave me the sensation of a vacuum pulling on my tongue.

Of course, it's not the snorkel pulling at all. I assume it's the same effect as mask squeeze.

A low pressure existed in the air-filled snorkel tube, which is a rigid airspace compared to the higher water pressure surrounding me.

High pressure moves towards low, whether gas or liquid. Bodies are mostly liquid, so my tongue started making for the mouthpiece.

It might sound like improper content for a scuba mag, but it's enshrined in Pascal's Law. However, unlike exhaling into a mask, I could not equalise the Tiga.

Conclusion

This makes for a difficult review. The Tiga simply isn't a casual snorkeller's snorkel.

It satisfies the need for an emergency snorkel for surface use and does so very well.

For those scuba-divers who hate snorkelling or, being honest, would struggle with an out-of-air surface problem if their snorkel shipped water, the Tiga makes total sense.

It's possibly a good choice for rental for those snorkel trips that insist on punters wearing life-jackets.

For me, I'd look elsewhere in Sherwood's snorkel range – the maker does after all offer conventional self-draining snorkels.

These have a top section to divert water from entering the breathing tube while at the surface, combined with a reservoir and drain-valve below the mouthpiece that deals with any water that does make it into the tube.

This design floods when you submerge and mostly empties under force of gravity as you surface, requiring only a slight exhalation to fully clear.

These models satisfy the needs of a safety snorkel for scuba and for "proper" snorkelling as well.

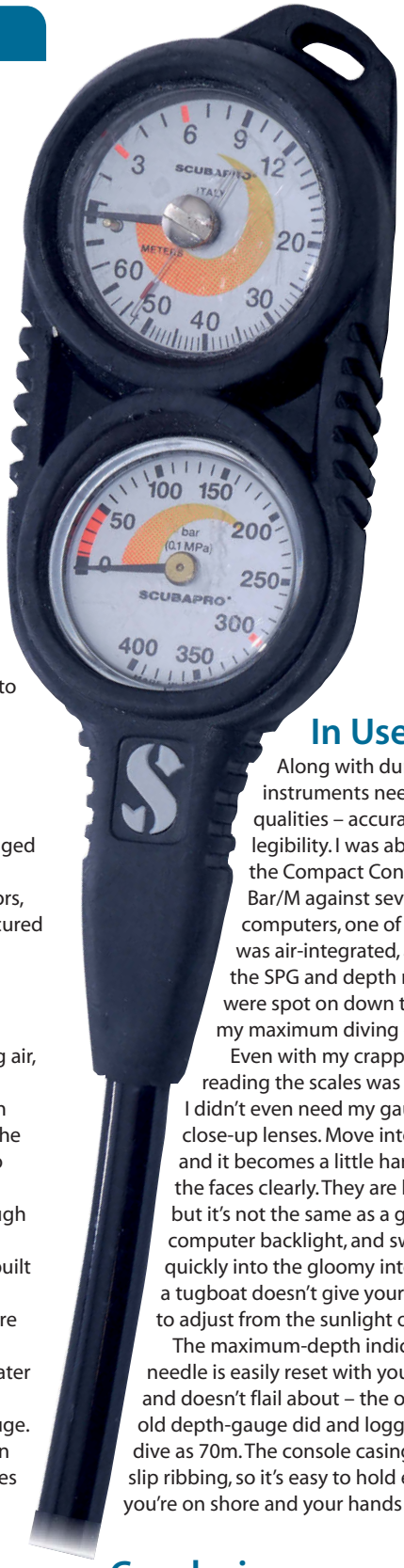
For freediving purists, Sherwood offers a classic valveless snorkel. ■

SPECS

PRICE ›› **£30**
COLOURS ›› **Clear, black, blue, teal, magenta, yellow**
CONTACT ›› **midlanddiving.com**

GAUGES

SCUBAPRO COMPACT CONSOLE BAR/M



AS A RECREATIONAL DIVER, once I'd had the opportunity to dive using a dive-computer I only ever went back to dive-tables once.

That was when a friend, who was the club diving officer, a Navy diver and a volunteer at his local hyperbaric chamber, concluded that computers were dangerous.

He didn't trust his own scuba agency's tables, and had instituted older Royal Navy ones instead. Still, we made some compromises and dived together. That was a quarter-century ago, and today he's a strong advocate for dive-computers. So it was poignant that I was diving with Dennis while reviewing the very traditional Scubapro Compact Console Bar/M (for metres).

In the electronic age, who would even use such a basic console? Not technical divers – the depth-gauge isn't rated deep enough. Accurately reading a scale if it was would be difficult because of how close the divisions would need to be.

For recreational diving, consoles are often issued as rental kit, or to students who have to learn to monitor depth and time during basic training. They are also occasionally chosen by casual divers who regard a computer as too complex or expensive to buy.

Given that it's likely the console will be used by newer divers, some context to the gauge versus computer debate might be helpful.

Firstly, gauge-diving is often very restrictive, forcing you to trade depth for time and severely limiting repeat dives. That's because it's not practical for tables to track a diver's personal ingassing and outgassing.

Table-users must usually, for safety reasons, round up to the deepest depth reached and treat the entire dive-time as if it was spent at that depth, even if it wasn't.

So repeat-dive calculations are often based on unrealistic assumptions.

A computer can crunch numbers and calculate in- and out-gassing very precisely. This precision gives you the longest dives possible with the least amount of decompression and shortest surface intervals.

It's also why it's dangerous for one diver to use a computer and buddies to try to match their profile. Even a small deviation in depth throws out the following diver's safety, and God forbid an unintentional separation.

As a back-up to a computer, however, gauges can be very valuable. Computers can fail under water – it's happened to me. Recreational divers doing no-stop dives who have been checking their computer regularly and quickly notice that it has failed are likely still to be within their no-stop time or to have incurred no more required decompression than can be done in the normal safety-stop range.

A depth-gauge allows you to control your ascent rate and maintain a stop. Once you get to your stop depth, being able to time it is probably not critically important. You've probably only got as much time available as your air lasts, so you might as well just breathe your tank down to near-empty and hope that's enough to clear any deco.

Scubapro's Compact Console allows you to monitor air and depth to achieve this.

The Design

The gauges themselves have solid polycarbonate bodies and plexi faces. A rugged polymer case acts as a protector from mild impacts and has an eyelet to attach retractors, lanyards or clips for keeping the gauges secured to your BC.

The pressure-gauge hose connects to a curved Bourdon tube, which air pressure attempts to straighten out.

Because the tube is open to the incoming air, it is called an open Bourdon tube.

This connects in turn to a rack-and-pinion mechanism that drives the needle around the face. As pressure reduces, the tube is able to recoil and the needle drops towards zero.

Because high-pressure air breaking through the Bourdon tube and into the body could cause the face to blow out, a safety port is built in to ensure that gas leaks away harmlessly.

The main reason for a Bourdon tube failure would be a wet air-fill or not sealing your regulator before rinsing, which would let water into the tube and cause corrosion.

A depth-gauge is also just a pressure-gauge. In an open Bourdon design, the tube is open to the water. However, this can allow particles to enter that can disrupt the readings.

Scubapro uses a sealed Bourdon tube that contains air – its end is sealed. The mechanism is enclosed in oil. External water pressure acts on the gauge body and is transmitted through the oil to the tube which coils and uncoils with pressure – or depth – variations, driving the needle around the scale.

The sealed Bourdon or oil-filled design does away with silting issues. There's a maximum-depth indicator, basically a slave needle driven around the scale by the main one.

As you ascend, this needle is left behind, indicating the deepest point of your dive.

In Use

Along with durability, instruments need two qualities – accuracy and legibility. I was able to test the Compact Console Bar/M against several dive-computers, one of which was air-integrated, and both the SPG and depth read-outs were spot on down to 30m, my maximum diving depth.

Even with my crappy eyesight, reading the scales was easy, and I didn't even need my gauge reader close-up lenses. Move into a wreck and it becomes a little harder to see the faces clearly. They are luminous, but it's not the same as a good computer backlight, and swimming quickly into the gloomy interior of a tugboat doesn't give your eyes time to adjust from the sunlight outside.

The maximum-depth indicator needle is easily reset with your thumb and doesn't flail about – the one on my old depth-gauge did and logged every dive as 70m. The console casing has non-slip ribbing, so it's easy to hold even if you're on shore and your hands are wet.

Conclusion

If you're looking for a combined pressure- and depth-gauge combo, I'm very happy to highly recommend the Scubapro Compact Console Bar/M. ■

SPECS

PRICE ▸▸ **£163**

CONTACT ▸▸ **scubapro.com**

NEW BUT UNTESTED

The latest kit to hit the dive shops

O'Three T Shirt ▲▲▲▲

With the film *My Octopus Teacher* a runaway hit, why not sport an O'Three octopus T-shirt? It's just one of a range of fun clothing designs including hoodies, caps and beanies from the famed British drysuit brand. The shirts are said to be Earth-positive and climate-neutral as well, and cost £20.

othree.co.uk

Hollis F1 Fins ▲▲▲▲

Hollis has announced new colours for its F1 fin – yellow and white. Yellow can make a diver easier to identify in low visibility, while white enables underwater photographers to colour-balance on their foot, it says, which makes sense. The £140 all-rubber vented fins include spring-heel straps with adjustable positioning for fine-tuning their fit and are claimed to provide considerable power for minimal effort.

hollis.com

Cressi AC25 / Master Cromo Regulator ▼▼▼▼

New from Cressi, this regulator has a balanced-piston first stage with four medium-pressure ports arranged on a swivel and a fifth coming straight off the end of the piston for easy hose-routeing of second stages and direct feeds. Two hp ports take care of pressure gauges or transmitters. The titanium-fronted second stage is pneumatically balanced and has adjustable breathing. The price? £499.

cressi.com

TUSA TC 1 Computer ▼▼▼▼

TUSA's entry-level £249 watch-style dive-computer employs a single-mix air/nitrox Buhlmann ZHL-16C algorithm and has Gauge and Freediving modes. It's equipped with vibration and audible alarms and can log 900 dives. The four-button menus are claimed to be intuitive to use and the unit is powered by a rechargeable li-ion battery.

cpspartnership.co.uk

Akona Yukon Weight Bag ◀◀◀◀

The Yukon is designed for schlepping your diving ballast to and from your car to your shore dive-site or boat. With 7-litre volume and measuring 30 x 14 x 14cm, the bag has a reinforced base and wrap-around handles and will cost you £30.

midlanddiving.com

Divertug DT Combi DPV ‹‹‹‹

Spanish manufacturer Divertug reckons its modular DT Combi scooter is a good choice for recreational divers moving into technical diving, or for shorter technical explorations. It's 130m-rated and weighs 10.2kg in its short version, which is said to deliver up to two hours' runtime. Adding a longer nose-cone and larger battery extends this north of 200min, says Divertug. The short version costs 1662 euros, the long 2162 euros, both plus taxes.

»divertug.com

Gates Z3 Camera Housing ››››

Professional underwater film-makers can now submerge the Z-Cam E-2-S6, E2-F6 and E2-F8 broadcast cameras in the latest Gates Z3 housing. Weighing in at a mere (for such cameras) 11kg, the aluminium Z3 can be dived to 75m. There is a built-in monitor and assignable controls for special lens features, and a vacuum-tester is included. This housing costs from US $8000 plus tax.

»espritfilm.co.uk

TUSA Intega Mask ‹‹‹‹

TUSA promises exceptional comfort and a perfect seal with its new face-mask. A feature it calls 3D SYNQ is said to help the skirt mould to your face, and a rounded edge and dimpling of the skirt is designed to avoid after-dive mask rings. A choice of corrective lenses is offered. The Intega costs £85.

»cpspartnership.co.uk

LISA COLLINS

NEXT ISSUE

Atlantic Surprises
Wild experiences on a trip to Madeira & Porto Santo

Unexpected Muck
Koh Tao's critters – you just need to know where to look

No Place for Tourists
Rewarding time off work in northern Mozambique

A for Arran
Working wonders around the Scottish island

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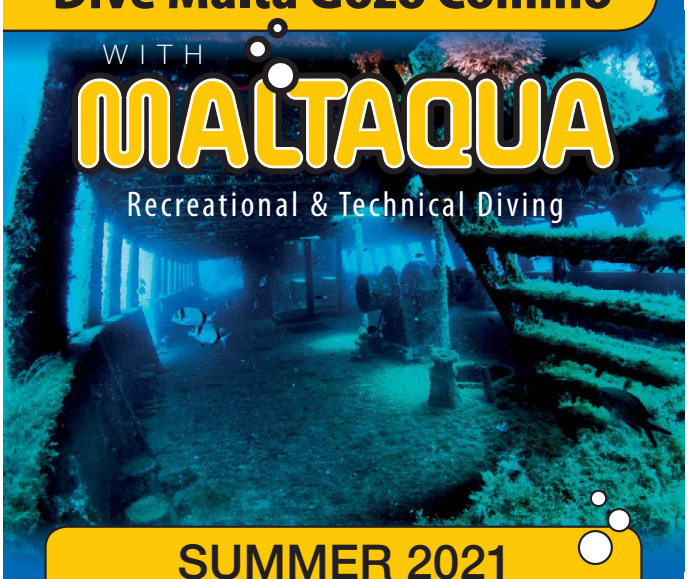

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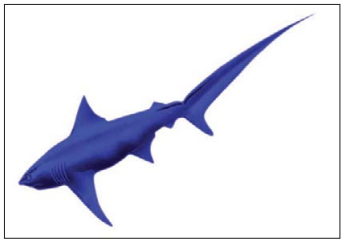

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Venture Dive Charters. For quality diving from Plymouth, visit: www.venturecharters.co.uk or Tel: 07948 525030. (73533)

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Diving Medicals - Midlands (Rugby) - HSE, Sports Medicals and advice at Midlands Diving Chamber. Tel: 01788 579555 www.midlandsdivingchamber.co.uk (72756)

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Alfreton (Derbys) BSAC 302. Welcomes new members and qualified divers. A small but active club with own RIB, wreck diving a speciality. Contact Angela on 07866 799364. (68370)

Appledore Sub-Aqua Club (SAA 35) Friendly club welcomes experienced divers from all agencies . Regularly dives Lundy island , own hard boat / compressor . Contact Damian 07831 152021.

Banbury SAC. Friendly, active club with weekly meetings and training sessions, own boat, compressor and equipment. Welcome divers/non-divers. www.bansac.org or call 07787 097 289. (69308)

Birmingham Underwater Exploration Club. Friendly, active dive club. Weekly pool sessions. Regular trips. Own RIB based in south Devon. Training and equipment loan available to members. Tim 07775 580033.

Bracknell Sub Aqua Club welcomes new and experienced divers from all agencies. Meets poolside at Bracknell Sports Centre, Thursdays from 8.30pm. Diving, training and social calendar: www.bracknellscuba.org.uk or tel: 07951 855 725. (65792)

Braintree Riverside Sub Aqua Club based in Braintree, Essex. A friendly club, we welcome divers of all abilities and have an active diving and social programme. Come and join us! email: denise.f.wright2@btinternet.com www.braintreeriversidesac.co.uk (69397)

Bromley/Lewisham Active divers required. Full programme of hardboat diving throughout the year. Check out Nekton SAC www.nekton.org.uk or contact Jackie (01689) 850130. (68537)

Buckingham Dive Centre. A small friendly club welcoming all divers and those wanting to learn. We dive throughout the year and run trips in the UK and abroad. www.stowe subaqua.co.uk Tel: Roger 07802 765366. (69433)

Chelmsford and District SAC meet at 8pm every Friday at Riverside Pool. New and qualified divers are welcome. See our website for details: www.chelmsford diveclub.co.uk (68620)

Cockleshell Divers, Portsmouth, Hants. Small, friendly club welcomes new and experienced divers from all agencies. Meets at Cockleshell Community Centre, Fridays at 8pm. Email: cockleshell.divers@aol.co.uk (64762)

Colchester Sub-Aqua Club welcomes experienced divers and beginners. Sub-Aqua Association training. Diving at home and abroad. Meets at Leisure World Friday evenings. Contact Tony (01787) 475803. (68263)

Chingford, London BSAC 365. Friendly and active club welcomes divers from all agencies and trainees. Meet Wednesday 8pm, Larkswood Leisure Centre E4 9EY. Information: www.dive365.co.uk Email: loughton divers365@gmail.com (69208)

Cotswold BSAC, a friendly club based at Brockworth Pool, Nr Cheltenham, Fridays 8pm. Regular inland diving and coast trips. Tel: 07711 312078. www.cotswoldbsac 332.co.uk (68577)

Darlington Dolphins Sub Aqua Club, small friendly BSAC/PADI, open to new and experienced divers. Meet Friday night in Dolphin Centre at 8.30. Tel: 07773 075631 or email robkilday@hotmail.co.uk (72665)

Darwen SAC, in Lancashire, with an active diving programme. Own RIB. new members welcome regardless of agency/training. We provide BSAC training. Weekly pool sessions. www.darwensac.org.uk (69161)

Dream Divers. Very friendly dive club in Rotherham welcomes divers of any level/club. Meet at the Ring O Bells, Swinton, last Thursday of the month at 19.30. Email: info@dreamdiversltd.co.uk (69699)

Ealing SAC, BSAC 514. Friendly, active club, own RIBs; welcomes new and experienced divers. Meets Highgrove Pool, Eastcote, Tuesday nights 8.30pm. www.esac.org.uk (68413)

East Cheshire Sub Aqua. Macclesfield based BSAC club. Purpose-built clubhouse, bar, two RIBs, minibus, nitrox, compressor. Lower Bank Street, Macclesfield, SK11 7HL. Tel: 01625 502367. www.scubadivingmacclesfield.com (65609)

East Durham Divers SAA welcome new/experienced divers of any agency. Comprehensive facilities with own premises half a mile from the sea. Contact: John: 07857 174125. (68663)

East Lancs Diving Club based in Blackburn. Friendly, active club welcomes new members at all levels of diving from all organisations. Tel: 07784 828961 or email: ELDC@ hotmail.co.uk www.eastlancsdivers.co.uk (69411)

Eastbourne BSAC; RIB, Banked air (free) to 300bar, Nitrox, Trimix. Enjoy some of the best diving on the South Coast, all qualifications welcome. www.sovereigndivers.co.uk (65695)

Eastern Sub Aqua Club SAA 1073. We are a small friendly dive club and welcome new and experienced divers alike. We are situated north of Norwich for training. For more information please see out website: www.esacdivers.co.uk (65879)

Ellon Sub Aqua Club, Aberdeenshire, welcomes newcomers and experienced divers. We dive year round and meet on Thursday evenings. Contact www.ellonsubaquaclub.co.uk (65523)

Fife Scuba Divers Tel: 07575 372575. www.fifescubadivers.com. SAA Club No203. Meetings: Thu 19.30, 81 East Way, Hillend, KY11 9JF. Training Club, Crossovers welcome. (72380)

Flintshire Sub Aqua Club based in Holywell, Flintshire, welcomes new and experienced divers from all agencies. Full dive programme. Meet Wednesdays. See us at www.flintsac.co.uk or call 01352 731425. (64293)

Guildford BSAC 53. Welcomes new and qualified divers. Friendly, active club with 2 RIBs, compressor, Nitrox, meets Tuesday at clubhouse with bar. www.guildford-bsac.com or call 07787 141857.

Hartford Scuba BSAC 0522, based in Northwich, Cheshire. A friendly, active diving club. Compressor for air and Nitrox fills. RIB stored in Anglesey. www.hartfordscuba.co.uk (67287)

Hereford Sub Aqua Club, is looking for new members. Regular diving off the Pembrokeshire coast on own RIBs. Training and social nights. Contact: rusaqua@googlemail.com (69146)

HGSAC. South Manchester based friendly, non-political club welcomes newcomers and qualified divers. Lots of diving and social events. Family. Three RIBs and compressor. www.hgsac.com (68501)

High Wycombe SAC. Come and dive with us - all welcome. Active club with RIB on South coast. Contact Len: 07867 544 738. www.wycombesubaqua.com (69131)

HUGSAC - BSAC 380. Experienced club, based around Hertfordshire, with RIB on the South coast. Members dive with passion for all underwater exploration. All agencies welcome. www.hugsac.co.uk (63275)

Ifield Divers. Crawley-based club. Twin engine dive boat with stern lift in Brighton Marina.Training for novices, diving for the experienced - all qualifications welcome. www.ifield-divers.org.uk Email: info@ifield-divers.org.uk or tel: 01883 731532. (64514)

Ilkeston & Kimberley SAA 945, between Nottingham and Derby, welcomes beginners and experienced divers. We meet every Friday night at Kimberley Leisure Centre at 8.30pm. Contact through www.iksac.co.uk (68559)

K2 Divers, covering West Sussex/Surrey. A friendly BSAC club, but all qualifications welcome. Training in Crawley, boat at Littlehampton. Email: k2divers@yahoo.co.uk or tel: (01293) 612989. (68335)

Kingston BSAC, Surrey. Two RIBs , clubhouse and bar, active dive programme, two compressors, Nitrox, Trimix, full training offered at all levels. All very welcome. www.kingstonsac.org or tel: 07842 622193. (69176)

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INSURANCE

diving club with our own RIB are looking to welcome new and experienced divers. Contact Richard: 07931 170205. (69383)

Lincoln and District BSAC. Active club with own RIB, compressor and other facilities. Regular trips and training. www.lincolndivingclub.co.uk (69336)

Lincs Divers BSAC 1940. Friendly, active dive club offering dive trips and training for new/experienced divers. Lincoln based. www.lincsdivers.co.uk

Llantrisant SAC, two RIBs, towing vehicle, welcomes new and experienced divers. Meet at Llantrisant Leisure Centre 8pm Mondays. Contact Phil: (01443) 227667. www.llantrisantdivers.com (68519)

Lutterworth Dive Club, active, social, friendly. Own RIB, regular trips. Welcomes qualified divers, any agency. Training at all levels. Most Tuesdays, Lutterworth Sports Centre. www.lsac.co.uk (70043)

Leeds based Rothwell & Stanley SAC welcomes new and experienced divers, full SAA training given. Purpose built clubhouse with bar, RIB, compressor. Meet Tuesday evenings: 07738 060567 kevin.oddy@talktalk.net

Mansfield and District Scuba Diving Club. www.scubamad.co.uk. Sub Aqua Association - club 942. 8 Beech Avenue, Mansfield, Notts. NG18 1EY. (71643)

Manta Divers. Norfolk wreck & reef diving. Small, friendly, experienced club. All agencies welcome. SAA training. www.mantadivers.org (64088)

Mercian Divers (BSAC 2463) Active & Friendly club. New, experienced & junior divers welcome. Own RIB. Based in Bromsgrove, West Midlands. Tel: 01905 773406 www.mercian-divers.org.uk (65391)

Merseydivers (BSAC 5) Friendly & active club with 2 RIBs & Compressor/Nitrox/Trimix. Meeting every Thursday 7pm till late. All divers welcome. www.merseydivers.com or call Steve on 07570 015685.

Merseyside training club, new and active divers from all agencies, weekly pool session. Own Rib towing vehicle Contact www.wapsac.org.uk or wapsacsac@gmail.com

Millennium Divers. Active, friendly club for all levels and certifications of diver, based in Portland, Dorset. UK diving and holidays. Club social nights www.millenniumdivers.org (68351)

Mole Valley Sub Aqua Club. Surrey based SDI club, own RIB, active diving UK & Abroad, training and social events. Trainees/crossovers welcome. Contact: 07410 949268 or email: info@mvsac.org.uk (68691)

Monastery Dive Club (Dunkerton Branch). New divers welcome to join our club. Trips to Plymouth and NDAC. GSOH is a must. South Wales area (Crosskeys, Risca.) Text: Flinty 07971 432803 or email: welshflinty@hotmail.com (65305)

Nekton SAC. Based in Bromley, we are a friendly and active SAA Club that welcomes experienced and new divers alike. Info@nekton.org.uk or call Steve: 020 8467 4599. (68387)

Nemo Diving Club. Small friendly dive club offering dive trips and training for non/experienced divers in Retford and surrounding areas. Contact: www.nemodiver training.co.uk (69640)

North Wales Sub Aqua Club. Llandudno based and open to new and experienced divers. Fun, friendly and active SAA affiliated club. Training every weekend. www.nwsac.wales (70688)

North Glos BSAC 80. Friendly, active club welcomes new and experienced divers. Own boat and equipment with weekly pool sessions, Thursdays, 8.30pm at GL1 Gloucester, (Gloucester Leisure Centre). www.nglos.co.uk (68483)

Nuneaton. Marlin BSAC welcomes experienced divers to Pingles pool every Thursday. Active training, diving, social programme in a flourishing club with no politics allowed. www.marlinsac.com (69322)

Orkney SAC. Small, friendly active dive club, based in Kirkwall, welcomes divers of any level or club. Own RIB and compressor. Contact Craig: 07888 690 986 or email: craigbarclay31@hotmail.com (69735)

Plymouth Sound Dive Club welcomes qualified and experienced guest divers. See www.plymouthdivers.org.uk for more information/weekly club notices. Contact relevant dive manager or divingofficer@plymouth divers.org.uk to join a dive. 72219)

Preston Divers SAA 30. The friendliest dive club. Come and meet us at Fulwood Leisure Centre, Preston on Monday nights between 8.00pm - 9.00pm. www.prestondivers.co.uk (64198)

Reading Diving Club. Experience the best of UK diving with a friendly and active club. All welcome. Tel: 01183 216310 or email: info@thedivingclub.co.uk www.thedivingclub.co.uk (69447)

Reading Sub-Aqua Club (BSAC 28). Active, friendly, based Palmer Park. Clubhouse, licenced bar, compressor, 2 RIBs. Club night Thurs, all grades/agencies. Training to Adv Diver +. rbsacinfo@gmail.com www.rbsac.org.uk Tel: Colin 07939 066524. (72402)

Richmond Sub-Aqua Club (Surrey) welcomes new and experienced divers. Very active diving, training and social calendar for about 100 members. Contact: contact.rsac@gmail.com, www.richmondsubaqua.club, 07843 959 775.

Robin Hood Dive Club. Yorkshire based and one of the most active in the country with a full 2019 calendar of trips. All agencies and grades welcome. No training or pool, just a growing bunch of regular divers. www.robinhooddiveclub.com or find us on Facebook. (59245)

Rochdale Sub-Aqua Club. Beginners and experienced divers welcome. Full training provided. Pool session every Wednesday. Club has two boats. More info at www.RochdaleDivers.co.uk or call Mick 07951 834 903. (65103)

Ruislip & Northwood BSAC. Friendly, active club, RIB, welcomes new and qualified divers. Meets Highgrove Pool Thursday nights 8.30pm. www.rnbsac.co.uk Tel: 07843 738 646 for details. (69469)

Scotland Plug Divers. Small, friendly dive club welcomes newly qualified and experienced divers to join us. Regular hardboat diving around Bass Rock/Firth of Forth/Eyemouth and trips abroad. Tel George: 07793 018 540. Email: plugdivers@btinternet.com (64638)

Selby Aquanauts SAA 1117. Family friendly club, welcomes new and qualified divers. Regular trips UK & abroad. Meet every Thursday, Albion Vaults, Selby at 9pm. Contact Mark: 07831 295 655. (69261)

Sutton Coldfield SAC, friendly BSAC club, welcomes all divers from trainee to advanced. All agencies. Own RIBs and compressor. Meet every Wednesday, 8.15pm at Wyndley (3.4m pool). For free try dive call Alan: 07970 573638 or Mark: 07787 106191. (64974)

Sheffield BSAC36. Friendly, social and active dive club welcomes newcomers or qualified divers. Trips, socials, weekly pool and club/pub meetings, club RIB. See www.bsac36.org.uk (69191)

Slough 491 BSAC; small friendly club welcomes divers at all levels. Meet at Beechwood School Fridays 19.30. Diving holidays and South Coast. Email: malcolm@uv.net or tel: Tony (01344) 884 596. (69722)

SOS Divers (SAA 263), Stourport, Worcestershire. Founded 1979. Friendly family club welcomes qualified and trainee divers. Own RIB. Contact Althea by email: arannie123@outlook.com (57542)

South Coast Divers (SAA 1150) Portsmouth. A friendly and active club welcomes new and experienced divers from all agencies. Email: southcoastdivers@hotmail.co.uk or call Darren: 07449 794 804. (69224)

Totnes SAC (Devon). We are an active multi-agency club and welcome new members and qualified divers from all organisations. Two RIBs and own compressor/nitrox, plus club 4WD. Diving all round South Devon and Cornwall. Visit www.totnes-bsac.co.uk for details. (68319)

South Queensferry SAC, near Edinburgh. Two RIBs, gear for hire. Pool training during the Winter; trips & expeditions in the Summer. Pub meeting at Hawes Inn. Call Warren: 07980 981 380. www.sqsac.co.uk (64861)

Steyning Scuba Club, West Sussex. All divers welcome. Steyning Pool , Monday evenings at 8.30pm. Contact Andy Willett on 07786 243 763. www.seaurchin divers@hotmail.co.uk (63956)

The Bath Bubble Club SAA777 seeks new members. New and qualified divers of all agencies welcome. Weekly pool training, every Wednesday at 9pm, Culverhay Sport Centre, Rush Hill, Bath. Regular diving programme from club RIB. www.bathbubbleclubuk.co.uk (68434)

Wells Dive Group. Friendly, active club in Somerset welcomes new or experienced divers. Meeting/training at The Little Theatre or the pool on Thursdays, try dives available. Regular RIB diving, trips around the UK and abroad. Visit: www.wellsdivers.co.uk or Tel: Rob, 07832 141250. (69653)

TridentDivers.co.uk (find us on Facebook) Cardiff-based SAA club taking on new trainees and crossover members contact us on 07547 398802. (71656)

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02/21

‘We got plenty of threats and the physical danger was real’

The Pacific’s Revillagigedos Islands, far off the Mexican coast and often referred to as Socorro, are known as a world-class diving location, but it’s not so long since illegal fishing-boats lorded it over these seas. It was diving operators and their up-for-it customers that changed all that – none more so than MIKE LEVER

WE LOVE OUR SHARKS and manta rays, but have always been very modest about the extraordinary efforts we have made to protect and better understand these beautiful animals.

We first arrived in Mexico in 2002 as coldwater divers used to the giant octopuses, wolf-eels and sea-lions of British Columbia and Alaska. It didn’t take long to fall in love with the friendly giants of Socorro Island, *Manta birostris*.

It took a little longer to get comfortable with the sharks! We weren’t used to sharks and, to be honest, at first found them somewhat scary.

In those days there were very few sharks in the waters around Socorro, so we didn’t get to see that many. The place was under immense fishing pressure, from illegal long-liners out of Mazatlan to massive corporate-owned tuna-seiners complete with helicopters and kilometre-long purse seine nets.

Even the sport-fishing boats from Cabo San Lucas were in the islands, slaughtering everything they could catch.

I remember on our first trip to Socorro watching a big white shark sport-fishing boat anchored at Cabo Henslow and jigging for sharks off the back deck.

I dived under the *Legal Eagle* that night and counted more than 20 gutted sharks – killed just for the sport. Something clicked and, while I was new to islands and to sharks, I felt nauseated. My fighting instinct kicked into full force.

WE STARTED PHOTOGRAPHING and recording all the illegal fishing we were observing, and cutting and freeing up nets and long-lines that we found tangled on underwater reefs, still catching fish, sharks, dolphins and turtles long after they’d been abandoned. We called them zombie nets.

I’m a stubborn, driven kind of person. I soon became more aggressive and started chasing down fishing-boats with our big steel dive-boat. I would intercept the bad guys with *Nautilus Explorer*, get as close as 6m away in open ocean and be really obvious about shooting film and video.

I would tell the fishing guys over the radio that we were in contact with navy interceptors who were on their way.

Unfortunately, that didn’t accomplish much other than plant us squarely in the crosshairs of all the bad guys.

In those days there was only one other dive-boat in the islands, the *Solmar V*.

So that was lots of illegal fishing, hardly any navy presence, two conservation-minded dive-boats and repeated warnings from the local authorities to stop getting in fishermen’s way.

Socorro Island was not a mainstream diving destination. Our guests were almost always up for bailing on the diving if it meant we would go after an illegal fishing-boat. They wouldn’t hesitate to jump in to help us remove nets and line and record the horrors we were seeing under water.

We took heartbreaking images and video of trapped and dead animals – killed not for harvest but by nets that would take decades or longer to rot and stop killing.

We became very unpopular. Local sport-fishing captains in Cabo would get angry.

We got plenty of threats and the physical danger was real. Eventually everyone was warning me that it would be stupid to get off the boat without protection.

Menacing guys made their presence obvious around the dock in Cabo. Chased out of there, we started using the beach in San Jose as a base. It was cool to pick up guests off the beach at night and ferry them out to the boat by Zodiac.

We soon got chased out of there too, and relocated 60 miles up the coast in the tiny village of Los Frailles, with more midnight pick-ups off the beach. The bad guys told the authorities that we were running drugs, and we were run out of Los Frailles.

We finally settled 15 hours up the coast in La Paz, which added a helluva long schlep to our runs down to Socorro.

Amazingly, our guests were totally cool with all the inconvenience. They were exciting times and I will be eternally grateful for their wonderful support.

La Paz, the “City of Peace”, turned out to be a great fit for us, because of its strong conservation culture. It would be quite a time before we could use Cabo again.

I kept going after illegal fishing-boats and started two conservation funds with the International Community Foundation out of San Diego, one for Socorro and the other for Guadalupe.

I still run both funds and we have raised almost all the donations from guests and our own corporate donations. I even bought a twin-engined Beech Baron aircraft and donated its use to the National Parks Service for aerial patrols.

THINGS CAME TO A CLIMAX in March 2008 when I intercepted two illegal fishing-boats that had encircled the pinnacles and cleaning stations at the Boiler off San Benedicto Island with drift-nets.

Irate, I chased one of the boats for hours before we “persuaded” it to return for navy inspection.

Worried about gunfire, during the chase, I asked our guests repeatedly to take cover on the lower deck.

It took every political contact we had to persuade a navy interceptor to divert from narco patrol and inspect the boat, but it found hundreds of shark fins and six dead mantas onboard.

We then dived the nets and, as well as dolphins, turtles, silky and hammerhead sharks, counted 22 dead threshers – the one and only time we ever saw threshers in the islands.

With the help of a famous TV reporter, the government took action.

We kept going, doing as much political work as possible. More dive-boats showed up, the islands became in turn a biological reserve, a UNESCO heritage site and then the largest marine park this side of North America. Things calmed down.

The shark and manta population rebounded. The diving has since become simply excellent. It’s a wonderful outcome.

We love the mantas and sharks more than ever and – in normal times – are super-happy to help 4000 divers a year get in the water with our beautiful friends.

Much credit is due to Mexico’s government, navy and the National Parks Service for all they have accomplished in improving the protection of the islands over the years.

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